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THE CONCEPT AND APPLICATION OF TURNKEY  
CONSTRUCTION CONTRACTING IN THE NAVY

John William Ster

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## Monterey, California



# THESIS

The Concept and Application of Turnkey  
Construction Contracting in the Navy

by

John William Ster

December 1974

Thesis Advisor:

J. F. Schumann

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The Concept and Application of Turnkey

Construction Contracting in the Navy

by

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Lieutenant Commander, United States Navy

B.S.M.E., Indiana Institute of Technology, 1959

Submitted in partial fulfillment of the  
requirements for the degree of

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December 1974



## ABSTRACT

Increasing construction costs for military construction and family housing projects are severely testing the conventional method of contracting. The turnkey contractual method of design-build has been previously used in the process industries and most recently for DOD family housing construction.

This thesis reviews the construction procurement inter-relationships including the architect-engineer, constructor and the contractual documents. The turnkey concept as used by the private and public sectors is explored, the military services approach is reviewed and the turnkey concept evaluated. Trends in the contractual methods of the private and public sector are discussed and the turnkey method is presented as a concept that has not been fully evaluated nor previously permitted to be used extensively within the Department of Defense beyond the limits of family housing construction.



## TABLE OF CONTENTS

I.	INTRODUCTION	8
A.	BACKGROUND	8
B.	PROBLEM STATEMENT	10
C.	SCOPE	10
D.	OBJECTIVES	11
E.	RESEARCH METHODS	12
F.	ORGANIZATION	13
II.	CONSTRUCTION PROCUREMENT	15
A.	INTRODUCTION	15
B.	CONVENTIONAL CONSTRUCTION PROCUREMENT PROCESS	16
C.	ARCHITECT-ENGINEER SERVICES	18
D.	CONSTRUCTION CONTRACTOR	20
E.	CONTRACTUAL INSTRUMENTS	21
	1. Competitive-Bid	22
	2. Negotiated	24
III.	TURNKEY CONCEPT	30
A.	ROLE IN CONSTRUCTION INDUSTRY	30
B.	ACTIVITY IN FEDERAL GOVERNMENT	32
	1. Congress	32
	a. General Accounting Office	33
	b. House of Representatives	35



(1)	Committee on Armed Services	35
(2)	Committee on Appropriations	37
c.	Senate	37
(1)	Committee on Armed Services	37
(2)	Committee on Appropriations	39
2.	Department of Defense	39
3.	Department of Health, Education and Welfare	41
4.	Department of Housing and Urban Development	42
5.	Environmental Protection Agency	46
6.	General Services Administration	48
IV.	MILITARY SERVICES APPROACH	52
A.	HISTORICAL OVERVIEW	52
B.	LEGAL BASIS	58
C.	ONE-STEP NEGOTIATION	61
D.	TWO-STEP FORMAL ADVERTISING METHOD	65
E.	POLICY AND GUIDANCE	66
V.	EVALUATION OF TURNKEY	70
A.	IMPACT ON CONTRACTORS	70
B.	COST ANALYSES AND REPORTS	75
1.	General Accounting Office	75
2.	Assistant Secretary of Defense-Comptroller	76
3.	Military Services	79
C.	VARIOUS POSITIONS	84
1.	American Academy of Environmental Engineers	84



2.	Associated General Contractors of America	85
3.	American Society of Civil Engineers	86
4.	Congress	87
a.	Commission of Government Procurement	87
5.	Consulting Engineers Council	89
6.	General Services Administration	93
7.	National Society of Professional Engineers	94
VI.	TRENDS IN TURNKEY CONSTRUCTION PROCUREMENT	96
A.	DEPARTMENT OF DEFENSE	96
1.	Current Position	96
2.	Future Position	98
B.	OTHER GOVERNMENT DEPARTMENTS AND AGENCIES	100
C.	PRIVATE SECTOR	102
VII.	SUMMARY, FINDINGS, RECOMMENDATIONS AND	104
	AUTHOR'S OBSERVATIONS	
A.	SUMMARY	104
B.	FINDINGS	113
C.	RECOMMENDATIONS	116
D.	AUTHOR'S OBSERVATIONS	119
	APPENDIX A ACRONYMS	121
	BIBLIOGRAPHY	123
	INITIAL DISTRIBUTION LIST	130



## I. INTRODUCTION

### A. BACKGROUND

The Department of Defense (DOD) since World War II has received a larger aggregate share of the Federal budget than any other agency of the Executive Branch. In the Korean War peak of 1953 its share was 60.3 percent with 4.3 percent identified for military construction and family housing.<sup>1</sup> Since that time the DOD percentage has been decreasing to the level that the share for Fiscal Year (FY) 1975 is 28.5 percent.<sup>2</sup> Faced with the inflationary costs for land acquisition, building materials, and construction labor, every method of economical construction procurement must be selectively employed to properly support the DOD, its military construction and family housing construction programs.

Military construction and family housing appropriations total approximately \$4.3 billion in FY 1975, 5.1 percent of the total \$86.8 billion DOD budget.<sup>3</sup> During the past twenty years, Congress has raised

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<sup>1</sup>Industrial College of the Armed Services, National Security Management-Procurement, 1973, p. 8.

<sup>2</sup>Congressional Quarterly Weekly Review, Vol. 32, No. 39, 28 September 1974, p. 2632.

<sup>3</sup>Congressional Quarterly Weekly Review, Vol. 32, No. 37, 14 September 1974, p. 2488.



the statutory construction cost limitation for family housing from \$14,500 to \$30,000 per unit.<sup>4</sup> During this same period of time the construction cost index has increased by approximately 100 percent.<sup>5</sup> Present forecasting indicates that construction materials, labor and ancillary costs will continue to be significantly higher regardless of statutory limitations and authorizations on family housing unit costs.

Today, the construction industry and especially home builders are being severely constrained with high interest and home mortgage rates. The DOD and the entire Federal government are faced with the challenge of expeditious concept-to-construction project completion bounded by statutory limitations and continuing inflation. There is no single solution to these problems. However, to be effective in future years, the DOD and the three military services must have at their disposal, with Congressional authorization, the use of the total spectrum of construction procurement techniques. The best method must be selected to complete military and family housing construction projects within the monetary limitations and time restraints.

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<sup>4</sup>Both the Senate and the House Committees on Armed Services versions of the FY 1975 Military Family Housing bill authorize a statutory limitation of \$30,000. The Joint Committee report was not available prior to the completion of this thesis.

<sup>5</sup>"Price and Cost Index for Construction and Selected Components of Construction: 1955 to 1972," Statistical Abstract of the United States, 1973, Table No. 1146, p. 678.



## B. PROBLEM STATEMENT

Construction procurement techniques must be available for management to effectively support the DOD mission and the associated construction of all military and housing projects. The purpose of this thesis is to review the traditional approaches of construction procurement; review, analyze and evaluate the turnkey concept and recommend modifications and improvements of DOD and Congressional construction policies for future consideration and implementation. The turnkey concept must be reviewed and analyzed in order to justify its consideration for additional employment beyond the existing limitations imposed by Congress and implemented within the DOD.

Turnkey contracting is a method wherein one contract is awarded for both the design and construction of a project. This differs from the conventional approach of awarding one contract for design and another contract for construction.

## C. SCOPE

One construction procurement procedure will not provide the solution to effective and efficient DOD military and family housing construction. The DOD has in the past utilized many procurement techniques including turnkey and recognizes that neither one-step nor two-step turnkey procedures are panaceas but are effective, specialized procurement tools when selectively applied.

This thesis will concentrate on the turnkey concept as employed by the construction industry, Federal government agencies and departments



including the DOD and the three services, the Air Force, Army and Navy. The concept will be evaluated using completed cost analyses. The positions of industry spokesmen and the Federal government including Congress will be identified and future trends in turnkey construction procurement will be discussed.

#### D. OBJECTIVES

The review of the turnkey concept will reveal its characteristics that are advantageous in its future utilization in attaining the following objectives:

1. Obtain construction within authorized project funds.
2. Obtain quality design and construction in accordance with sound and efficient commercial practices.
3. Provide facilities with low life cycle costs.
4. Complete projects within time schedules.
5. Permit builders maximum latitude within acceptable performance and recognized standards in providing site and unit design, materials and building systems.
6. Instill competitiveness in project acquisition.

Most construction procurement procedures will attain all or portions of these objectives under certain conditions. The ultimate procedure should satisfy all of the above objectives within the contexts of time, construction availability, state of the art and Congressional imposed statutory limitations.



## E. RESEARCH METHODS

Research for this thesis was conducted of available periodicals that contribute to the evolution of the turnkey concept and identify diverse viewpoints and noteworthy data. Textbooks were reviewed with emphasis on contract procurement and contract administration. Congressional reports and committee minutes provided the positions of the two chambers on use of the turnkey concept. Current DOD and Navy Instructions were reviewed to determine the degree to which turnkey is currently used. Examination of accessible government literature and documents revealed the philosophy of the agencies and departments. The Armed Services Procurement Regulations (ASPR) were researched to identify the legal basis for turnkey application. Personal interviews with upper management personnel in Washington, D.C. contributed to the research as viewed at their levels. Written correspondence with construction industry societies, councils and organizations provided viewpoints outside of the Federal government. Written correspondence with Federal government agencies supplied documents and literature highlighting their efforts with turnkey contracting. Point papers, cost studies and a thesis were reviewed and contributed to the data used.

The author has attempted to present an objective evaluation of turnkey contracting. Previous Navy tours may somewhat bias the presentation but this is unintentional.



## F. ORGANIZATION

This thesis reviews the background leading to the adoption of turnkey construction procurement within the DOD. It discusses the concept as viewed by industry and various levels of the Federal government. It also provides an overview of the military services approach. All of this is done in order to evaluate and develop conclusions for subsequent recommendations regarding future use of turnkey construction contracts.

Chapter I provides a general discussion of construction procurement, the basic parameters on which the thesis is developed and an overview of subsequent chapters.

Chapter II reviews the traditional approaches of construction procurement and the processes involving the architect-engineer (A-E) and construction contractor. A brief discussion is included on the construction industry and Federal government.

Chapter III scans the turnkey concept, the role of the construction industry and Federal government activity in turnkey implementation. The development of the concept as viewed by the General Accounting Office (GAO), the heightened interest exhibited by Congress and the implementation by agencies and departments is discussed.

Chapter IV traces the concept as implemented within DOD, identifies the legal basis for the one-step and two-step turnkey variations and concludes with DOD current policy and guidance.



Chapter V evaluates turnkey construction using cost analyses, reports and the impact and interest exhibited by contractors. The positions taken by various architect, engineering and construction societies and organizations regarding the use of turnkey contracting are presented in addition to the position taken by Congress.

Chapter VI discusses the trends in turnkey construction procurement within DOD, other Federal government departments and agencies and the private sector.

In Chapter VII, the previous chapters are summarized, findings are presented, and recommendations are provided advocating the increased utilization of the turnkey concept in conjunction with other management techniques. Finally, the author's comments are noted based on the thesis research, observations of the turnkey development and future potentials for implementation.

If the reader's time is limited, he can skip directly to Chapter VII as this chapter presents a detailed overview of the preceding chapters and the findings and recommendations. When, or if, additional time is available, Chapters II through VI may be read to provide the supporting details. Chapter VII has been written in sufficient detail to stand by itself.

Acronyms used within this thesis are listed in Appendix A.



## II. CONSTRUCTION PROCUREMENT

### A. INTRODUCTION

The Armed Services Procurement Regulations (ASPR) defines procurement as follows:

"Procurement includes purchasing, renting, leasing or otherwise obtaining supplies or services. It also includes all functions that pertain to the obtaining of supplies and services, including description (but not determination) of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration."<sup>6</sup>

It is readily apparent that the scope of procurement in DOD generates a greater range of material and service requirements than any other single enterprise in the world. Since most of these requirements are fulfilled through purchases from the private sector, the role of defense procurement is directed toward harnessing the capabilities of private industry in support of defense programs and concurrently in strengthening the free enterprise system.

Nearly one and one-half percent of all Federal funds in Fiscal Year 1975 were requested for construction of various civilian and military facilities. The amount authorized for the construction of military facilities totals approximately \$4.3 billion. While ranking behind the military procurement of aircraft, missiles, electronics and

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<sup>6</sup>U. S. Department of Defense, Armed Services Procurement Regulations, 1 July 1974, Section 1-201.13, p. 1:16.



communication equipment and a number of other prime programs, construction procurement has progressed through an evolution that has culminated in its own laws, techniques and trade practices.<sup>7</sup> Inherent in the construction process is the interrelationships existing between the A-E, construction contractor, and the agency of the Federal government.

## B. CONVENTIONAL CONSTRUCTION PROCUREMENT PROCESS

The cycle from facility requirement and identification until completion of construction and occupancy ranges from three to five years. The first two years are required for reviews by the Federal agency and the Office of Management and Budget (OMB) for inclusion in the President's budget and for congressional authorization and appropriation.<sup>8</sup> The remaining one to three years are occupied with design, bid, award, construction and acceptance by the user.

The design of the project is accomplished by in-house personnel, or in the majority of cases by an A-E with agency personnel participation through reviews and preliminary discussions prior to A-E selection. After selection, detailed plans and specifications are developed permitting calculation of the list of materials, items of equipment, labor and an

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<sup>7</sup> National Security Management-Procurement, op. cit., p. 12.

<sup>8</sup> Lyden, F.J. and Miller, E.G., Planning, Programming, Budgeting, A System Approach to Management, 2nd Edition, 1973, Chapter 2, pp. 41-59.



estimate of the construction required in order to develop the final construction cost estimate including contractor profit.

Upon completion of design and preparation of the final cost estimate, the agency formally advertises the project for sealed competitive bids on lump-sum or fixed-price contracts. Wide competition and bidder interest are generally solicited. Thirty to sixty days are normally allowed for bidding and the bids are publically opened and announced. Bids are normally accompanied by a bid bond or cash deposit. Award is then made to the low, responsive, qualified bidder. Pre-award surveys may be conducted to determine the workload of the bidder, financial capability, previous performance and compliance with other requirements.

Immediately after award of the contract, the contractor submits performance and payment bonds. Preconstruction conferences are held to coordinate requirements such as shop drawings submittals, concrete-mix designs, proposed construction schedule and other data that will assist the contracting officer in supervising, administering, and inspecting the work. As the work progresses, monetary progress payments are made based on work completed and, in some cases, for material delivered to the site. Upon completion of the construction, a pre-final inspection is conducted and punch lists developed identifying the items



of work to be completed or requiring correction. At this point, the facility may be conditionally accepted and beneficially occupied by the user.<sup>9</sup>

### C. ARCHITECT-ENGINEER SERVICES

The design and engineering function is a major phase in the construction procurement cycle. In general, architect-engineer (A-E) services may include all professional services associated with research, design, engineering, and construction of facilities. The services may encompass feasibility studies; planning; preparation of designs, drawings, specifications, and cost estimates for facilities; preliminary and master planning studies; consultation; investigations, and surveys. The principal service for which the Federal government has a demand is the preparation of final construction plans, drawings, designs and detailed technical specifications on which construction contractors can submit competitive bids.

Today, the procurement of A-E services for the Armed Services is exempt from the requirements of formal advertising for sealed bids and is arrived at through negotiation. Other government agencies that do not fall within the jurisdiction of the Armed Services Procurement Act of 1947 are subject to Public Law 92-582.<sup>10</sup> This law requires discussions

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<sup>9</sup> Department of the Navy, Naval Facilities Engineering Command, Washington, D.C., Contracting Manual, NAVFAC P-68, December 1972 with Changes.

<sup>10</sup> United States Statutes at Large, 92nd Congress, 2nd Session, Vol. 86, 27 October 1972, p. 1279.



with three or more firms regarding the anticipated concepts and relative utility of alternative methods of approach, ranking the three firms in order of preference and subsequent negotiations with the firm considered to be most qualified.<sup>11</sup>

The A-E selection by the Armed Services is described in the following scenario. Several A-E's are considered for a specific job on the basis of factors such as previous experience and performance, professional reputation and proximity to the construction site. They are rated by a selection board and after approval by the contracting officer, negotiations by a separate board are held with the highest ranking of three listed firms.<sup>12</sup> Solicitations of a price proposal and negotiations on a fixed lump-sum fee are not undertaken until after one A-E firm has been selected for negotiation. If an agreement is not reached with the selected firm, negotiations are terminated and new negotiations are commenced with the second ranking firm. This latter procedure is rarely experienced in the Armed Services. The A-E's fee consists of salaries, payroll costs, general and administrative costs, overhead, other direct costs and profit. The A-E fee differs from the concept of fee in cost-plus-fee contracts in which the fee paid is primarily profit.

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<sup>11</sup>Ibid, p. 1279

<sup>12</sup>ASPR, op. cit., Section 18-402.2, p. 18:16.



#### D. CONSTRUCTION CONTRACTOR

The construction contractors encompass another major phase in the construction procurement cycle. The contractors transform the plans and specifications created by the A-E into a useable structure or facility.

In 1967, there were approximately 129,000 general building and heavy construction contractors in the United States.<sup>13</sup> In addition there were over 221,000 trade contractors specializing in that portion of work for which they are specially suited including plumbing, electricity, heating and air conditioning, painting and decorating, masonry, roofing, carpentry, excavation and earthmoving, and iron and steel erection.<sup>14</sup>

The field of construction is as diversified as the uses and forms of the many types of facilities and structures produced. However, construction can be divided into three main categories - building construction, engineering construction, and industrial construction.<sup>15</sup>

Building construction includes buildings erected for habitational, institutional, educational, light industrial, commercial, social, and recreational purposes. The engineering construction involves structures not primarily architectural in nature but involving predominately the basic

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<sup>13</sup>"Selected Construction Industries-Summary by Industry:1967," Statistical Abstract of the United States, 1973, table 1144, p. 677.

<sup>14</sup>Ibid, p. 677.

<sup>15</sup>Clough, Richard H., Construction Contracting, Wiley-Interscience, 2nd Edition, 1969, p. 7.



engineering field materials, soil, rock, steel, concrete, piping and timbers. Subdivisions of this category are highway construction and heavy construction. The third category, industrial construction, includes the erection of projects associated with manufacturing or processing of a commercial product or service. Examples are petroleum refineries, steel mills, chemical plants, electric-power generating plants and similar installations.

The construction contractor occupies an essential position in the construction industry. His stock in the trade is his equipment and expertise. He acts as a manager for the necessary construction materials and labor. When bidding a project, he estimates how much the project will cost while it still exists only on paper. If his bid which includes a reasonable profit is selected, the contractor must complete the project for the contracted amount and within the specified time. If the actual costs exceed the bid, the construction contractor must bear the loss.

#### E. CONTRACTUAL INSTRUMENTS

The fundamental legal document between the seller of goods and services is a contract. Although there are many different types of construction contracts, they are generally classified on the basis of competitive bidding or negotiation.<sup>16</sup> The basic differences are in (1) the degree and timing of responsibility assumed by the contractor for the costs of performance, and (2) the amount and kind of profit incentive

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<sup>16</sup>Clouth, Richard H., op. cit., p. 89.



offered the contractor to achieve or exceed specified standards or goals.<sup>17</sup> The terms of the two contract types may be modified to satisfy the best interests of the government.

When procurement is accomplished by formal advertising, only the fixed-price contract, with or without provision for escalation may be used. Under negotiated procurement, DOD is authorized, subject to certain exceptions, to enter into any contract that will promote the best interests of the United States.<sup>18</sup> Contracts are also classified according to their form, (1) letter contract, (2) definitive contract, and (3) purchase order. These forms are used in construction contracting but are in support of the two principal types, competitive-bid and negotiated.

#### 1. Competitive-Bid

Competitive-bid contracts are customarily prepared on a fixed-price basis. In fixed-price contracts, the contractor agrees to perform a service for a price either specified in the contract or calculated from its terms. Fixed-price contracts consist of four basic categories:<sup>19</sup> firm-fixed price; fixed-price with escalation; fixed-price incentive; and fixed-price redeterminable.

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<sup>17</sup> National Security Management, Procurement, op. cit., p. 120.

<sup>18</sup> As noted by ASPR, the one type of contract specifically forbidden is the cost-plus-a-percentage-of-cost contract. ASPR section 3 discusses other exceptions in negotiated procurement.

<sup>19</sup> National Security Management, Procurement, op. cit., p. 122.



A firm fixed-price contract, also known as lump-sum, is an agreement by the contractor to carry out a stipulated job of work in exchange for a stipulated fixed sum of money. It is not subject to adjustment because of performance costs. This type of contract which carries the greatest degree of risk to the contractor also provides the maximum profit potential. The firm fixed-price contract is the basic type of contract for defense procurement and is preferred over all others. It is used for most construction projects.

Using a fixed-price redeterminable contract, the government and contractor negotiate an initial fixed price based on the best cost data or estimate developed at the time. An agreement is reached that at some specified future point in the contract, an adjustment will be made of the price initially negotiated in accordance with experience gained to that point of time. Upward or downward adjustments may apply to the past and future performance or just to future performance. This contract is usually restricted to quantity production or services purchases where it is possible to initially establish firm fixed prices but not for subsequent periods.

Fixed-price incentive contracts are profitable to a contractor when through his own efforts he can reduce costs or engineer superior performance into end items, and achieve optimum delivery of a product or service. The rationale for this contract is that the contractor will attempt to reduce costs, make a better product, or expedite production if he can share in cost savings and realize a profit from his superior performance. This



type of contract was introduced by the Federal government, primarily DOD, as an alternative to cost-plus-fixed-fee contracts.<sup>20</sup>

Fixed-price contracts with escalation provisions provide for upward and downward revision of the initial contract price in certain specified contingencies. If the contingencies occur, the Government either bears the burden of payments above the original fixed price or it benefits by decreases in costs.

The fixed-price with escalation and the firm fixed-price contracts can be used as a result of formal advertising, though both may also be reached through negotiation. All other contracts are the result of negotiation procedures.

## 2. Negotiated

The second major division of construction contracts consists of those that are the result of direct negotiation. These contracts can be on any basis including lump sum, unit price or cost-plus-fee.

There are two types of negotiated lump-sum contracts and the difference is reflected in the degree of project definition. In the first type, the contractor bases his bid on completely defined designs, drawings, specifications and layouts; the agreement usually stipulates that the contractor has full control over the operations pertaining to his

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<sup>20</sup>Baron, David P., "Incentive Contracts and Competitive Bidding," The American Economic Review, Vol. 62, No. 3, June 1972, p. 384.



scope of work. This type of lump-sum contract is not common in the processing industries except for certain structural applications.<sup>21</sup>

The second type of lump-sum contract is based on preliminary specifications. The bid definition takes the form of a lengthy and complex technical proposal volume. This type of contract has wide appeal if the project is based on known technology and when buying design, procurement and construction services from one contractor. This type of contract is the usual form for turnkey contracting.

Unit-price contracts are preferred where the design is well defined qualitatively but where the exact quantities are subject to wide variation. Payment for work is obtained by applying the bid price per unit on the computed quantities of work items actually performed and materials furnished and used by the contractor in the project. Unit prices are also quite often quoted as addenda to lump-sum or other fixed-price proposals.

The cost-plus contract is the most flexible of all contract types. The contractor is reimbursed for all direct costs incurred and allowable overhead costs plus a fee to cover his profit. This necessity for a guarantee to the contractor of some cost reimbursement is understood by both the Government and industry. Likewise, DOD has defined its contract cost principles, and these principles are well known to industry.

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<sup>21</sup>Gallagher, John T., "A Fresh Look at Engineering Construction Contracts," Chemical Engineering, 11 September 1967, Vol. 74, No. 19, p. 223.



Negotiated cost type contracts fall into four categories. The simplest form of cost reimbursement type contract is the cost contract. The contractor receives no fee but is reimbursed for allowable costs as governed by procurement regulations and the terms of the contract.<sup>22</sup> This type of contract is utilized for facilities construction or for research and development (R&D) work at research, educational and nonprofit institutions.

The cost-plus-fixed-fee (CPFF) contract involves a modification to the cost-plus type of contract wherein a fixed fee based on estimated costs is established at the beginning of the work. Regardless of the project final cost, the fee is restricted and fixed to a set amount. Based on previous DOD experience with this type of contract, ASPR indicates that CPFF contracts should normally "not be used in the development of major weapons and equipment, once preliminary exploration and studies have indicated a high degree of probability that the development is feasible and the Government generally has determined its desired performance objectives and schedule of completion."<sup>23</sup>

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<sup>22</sup> The Armed Services Procurement Regulations (ASPR) apply to the Department of Defense (DOD) and Defense Supply Agency (DSA) while the Federal Procurement Regulations (FPR) apply to all other Federal departments and agencies.

<sup>23</sup> ASPR, op. cit., Section 3-405.6(c), p. 3:45.



A further variation of the cost-plus contract is the cost-plus-percentage-fee with the contractor again being reimbursed for direct construction costs plus a percentage of the total cost.<sup>24</sup> This type of contract as well as the CPFF contract may be further modified to a cost-plus with guaranteed maximum contract.<sup>25</sup> This incorporates features of both the cost-plus and lump-sum contract. The contractor is reimbursed on the basis of cost-plus-a-percentage-fee or CPFF with the total price not to exceed a predetermined amount. Costs above this price are borne by the contractor.

A cost-plus-incentive-fee (CPIF) contract is a cost reimbursable contract wherein the contractor is paid allowable costs incurred in the performance of the contract. The contractor's fee is determined under a sharing formula in accordance with the relationship between total allowable costs and the target costs established during the original contract negotiations. Mr. Clough describes a sliding-scale fee contract falling into two general schemes.<sup>26</sup> The fee may be determined as a percentage of cost with the percentage increasing or decreasing when the actual costs fall below or above the target estimate. The second scheme is

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<sup>24</sup>Dunham, Clarence W. and Young, Robert D., Contract Specifications and Law for Engineers, McGraw-Hill Book Company, 1971, 2nd Edition, p. 127.

<sup>25</sup>Gallagher, John T., op. cit., p. 221.

<sup>26</sup>Clough, Richard H., op. cit., pp. 94-95.



similar to the first but uses a lump sum fee instead of a percentage fee. Under either arrangement, a minimum fee or percentage is stipulated that is not subject to decrease regardless of the final construction cost.

A variation of the CPIF contract is the cost-plus-award-fee (CPAF) contract. It resembles the CPIF in function in that each has a minimum and maximum fee between which the contractor receives a fee based upon the level of performance achieved. It is designed to provide an incentive to the contractor in respect to performance, delivery and cost. Using this contract, the contractor's performance is continually appraised by a Government board on a monthly or quarterly cycle and is paid according to the results of the appraisal. The payment is based on two factors, the first being reimbursement of actual costs incurred and second, the award (incentive) portion of the fee.

Within recent years, construction management (CM) contracts have received greater emphasis both from certain segments of the Federal government and private industry. The contract involves the owner, architect-engineer (A-E) and a qualified general contracting organization engaged to manage construction work on behalf of the owner.<sup>27</sup> Using a CPFF or cost-plus-a-percentage-fee contract, the contractor exercises general control over the construction and may also include full or partial control over the architectural and engineering services. This method

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<sup>27</sup>The Associated General Contractors of America, Owner's Guide, Building Construction Contracting Methods, undated, p. 5.



of contracting is further discussed in Chapter V in the discussion of the General Services Administration (GSA).

Design-build contracts, also known as design-construction, are frequently referred to as turnkey or package jobs. The single contract between an owner and contractor provides for all the preliminary studies, final design and construction of the project. These contracts may be made on the basis of lump-sum, cost-plus or guaranteed maximum price. The DOD has further identified this type of contract into one-step and two-step turnkey contracts. Detailed explanations of these two forms are discussed in Chapter IV.

The Associated General Contractors of America (AGC) have defined turnkey contracts as design-build contracts but also including "land acquisition, financing, leasings, etc."<sup>28</sup> The selection method, owner's requirements, advantages and disadvantages are basically the same as under the design-build contract.

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<sup>28</sup>Ibid, p. 8.



### III. TURNKEY CONCEPT

#### A. ROLE IN CONSTRUCTION INDUSTRY

Turnkey contracting as discussed by Mr. Clough is standard in much of Europe and Latin America.<sup>29</sup> He has stated that in the United States, it is more the exception than the rule, although a substantial portion of residential and industrial construction uses this contract concept. An examination of industrial construction (e.g., electric power plants) would reveal extensive use of turnkey contracting by specialists in the particular field of endeavor who make this their business. In fact, the Engineering News Record (ENR) annual report of the 400 top construction firms reveals the total gross of the design-construction (turnkey) firms list usually exceeds by a wide margin the gross receipts of the construction only firms.<sup>30</sup>

The initial concept of turnkey contracting obligated the contractor to complete the work of design and construction to the point ready for operation. This view has now been expanded to include a part of the complete spectrum of services that a contractor or engineer-constructor is capable of performing. These services may encompass economic

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<sup>29</sup>Clough, Richard H., op. cit., p. 95.

<sup>30</sup>"The ENR 400," Engineering News Record, Vol. 192, No. 15, 11 April 1974, pp. 46-58.



feasibility studies, conceptual design, life-cycle costing (LCC), engineering, purchasing, construction and start-up where applicable. This expanded concept of construction contracting has and is now being used for process chemical plants, refineries, pulp and paper mills, fertilizer plants, both thermal and nuclear steam electric power plants, cement plants, desalination plants, metallurgical plants, petrochemical plants, warehouses, manufacturing plants, material handling systems and many other similar applications.<sup>31</sup>

The turnkey contract has virtually dominated procurement of nuclear power source steam driven turbine-electric central-station power plants. It is only recently being used less due to both economic reasons and unavailability of adequate personnel to manage turnkey contracts in the increasing numbers of plants now being purchased.<sup>32</sup> This is generally the exception as more state and local government agencies and private industries are putting out projects for bids on a turnkey basis.

Mr. A. Maxwell best summarized the key feature in turnkey contracting in industry, "Perhaps the biggest selling point for package deals are their relatively accurate construction estimates. . . Hard-pressed clients want to know 'exactly how much this is going to cost,' and are

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<sup>31</sup>Westerhoff, Russell P., "Turnkey Contracts," Proceedings of the 5th Annual National Conference of Professional Engineers in Industry, NSPE, 12-13 October 1967, p. 31.

<sup>32</sup>Patterson, R. W., "Nuclear Contracting Without Turnkey," Power, Vol. 111, No. 8, August 1967, p. 110.



unhappy when consulting and architectural firms , for a variety of legitimate reasons persist in underestimating their projects by as much as 35 and 40 percent."<sup>33</sup>

## B. ACTIVITY IN FEDERAL GOVERNMENT

### 1. Congress

The United States Congress in implementation of the appropriation powers given to it by the Constitution has passed statutes that provide for procurement of services both by competitive bidding and negotiation. These statutes have been incorporated into ASPR for DOD and the FPR as used by other Federal government departments and agencies .

The Congress has advocated more competition in government procurement by advertised competitive bidding , fair evaluation of submitted bids , and awards to the lowest responsible bidder. Price is the primary though not exclusive determinant. The low bidder wins an award by a process which can be objectively shown.

Congress has authorized negotiated procurement and has expanded this concept through competitive negotiation. In recent legislation the Congress authorized:

"all contracts (except for architect and engineering contracts which , unless otherwise authorized , shall continue to be awarded in accordance with presently established procedures , customs and practice) be awarded insofar as practicable on a competitive basis to the lowest

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<sup>33</sup> Maxwell , Art V. , "CEC Comments-Let's Talk Turnkey , " Consulting Engineer , Vol 34 , No. 5 , May 1970 , p. 62 .



responsible bidder, unless under regulations established by the Secretary of Defense such contracts may be awarded on a competitive basis by turnkey one-step procedures."<sup>34</sup>

The interactions of the General Accounting Office (GAO) and the Committees of the two houses are further discussed in the following paragraphs.

a. General Accounting Office

The General Accounting Office (GAO) interest in turnkey construction contracting stems from their observations of its extensive use in the processing industries and the first use within the Federal government by the U. S. Department of Housing and Urban Development (HUD) in the 1966 acquisition of a high-rise apartment complex in Washington, D.C.<sup>35</sup>

In 1967, GAO conducted a study of a military base housing complex consisting of duplex and multi-family apartment units that were surrounded by single family unit private housing. In a September report to DOD, it was stated that the cost of military family housing was higher and quality lower than comparable private housing surrounding defense installations. The three reasons cited for higher military housing costs were:

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<sup>34</sup>U. S. Senate, Committee on Armed Services, Military Construction Authorization, Fiscal Year 1974, Senate Report No. 93-389, 93rd Congress, 1st Session, p. 55.

<sup>35</sup>U. S. Department of Housing and Urban Development, HUD Second Annual Report, March 1968, p. 44.



1. Military construction standards were not as economical as the Federal Housing Administration (FHA) and industry.

2. Inspections were more frequent and required more rigid adherence to specifications than those which industry is accustomed to under FHA standards.

3. The wage and labor rates on government contracts at some locations were higher than those prevailing in the same area for the construction of private dwellings.<sup>36</sup>

During 1971, GAO reviewed the use of turnkey construction contracting for the construction of family housing at three military installations, U. S. Naval Base, Philadelphia, Pennsylvania; Ent Air Force Base, Colorado Springs, Colorado, and Oak Knoll Naval Hospital, Oakland, California. It was reported, "that it will cost less to build houses under the turn-key method than it would have had they been conventionally built. The estimated savings were being realized without significant loss of quality or features normally found in conventional housing."<sup>37</sup>

Later in the year, GAO strongly criticized a turnkey contract let by DOD for family housing at Fort Carson, Colorado. The GAO's opinion on a bid protest blamed the turnkey method for much of

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<sup>36</sup> "Military-Housing Quality Faulted," Engineering News Record, Vol. 179, No. 25, 21 December 1967, p. 74.

<sup>37</sup> U. S. General Accounting Office, Letter B-170403 to Assistant Secretary of Defense (Comptroller), 24 September 1971.



the specific problem. The opinion held that the impossibility of drawing adequate specifications was largely "self-imposed, and an impossibility that derives from and is inherent in the turnkey concept."<sup>38</sup> Based on GAO's long-held preference for formal advertising they would have normally accepted the bid protest claim but since the Congress had encouraged the military to use turnkey contracts for housing, GAO under the circumstances did not object to the award.

In a later opinion wherein the Environmental Protection Agency (EPA) used turnkey contracts for construction of sewage treatment plants, GAO ruled that turnkey contracting was not permitted. This ruling was based on Congress intent for the EPA to divide their grants, with the first part paying for plans, specifications and estimates and the second part for the sewage treatment plant construction.<sup>39</sup>

b. House of Representatives

(1) Committee on Armed Services

Based on previous GAO reports of higher military housing costs as compared to conventional housing, this committee was deeply interested in the application of new procurement techniques. In the course of the FY 1969 Family Housing hearings, the general tone of the committee can be felt by reading the following testimony.

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<sup>38</sup>"GAO Raps Army Turnkey Housing Job," Engineering News Record, Vol. 187, No. 14, 30 September 1971, p. 11.

<sup>39</sup>"GAO Rejects Turnkey for Sewage Treatment Plants," Engineering News Record, Vol. 193, No. 3, 11 July 1974, p. 20.



Mr. Reed: We seem to be on a treadmill, constantly forced to trade off quality for cost, and this seriously affects our ability in meeting the objective of providing adequate modern family housing for career military. The general situation is not new to us. What is new is the rapid rate of increase. In the past, we have taken assorted steps to try to mitigate the problem. Currently we are exploring potential improvements such as "Turnkey" contracting, and more simplified specifications, in an attempt to hold the cost line.

Representative Hardy: I was hoping you would already to working on more simplified specifications.

Mr. Reed: We have been working on them. The specs have now been converted to a completely residential basis. The industry tells us they are much better. I think they are; they are simple, and we think they will make a material improvement in the contracting process.

Representative Hardy: It ought to bring about a reduction in cost.

Mr. Reed: I would hope so. That is the intent sir.<sup>40</sup>

In 1969, the committee agreed "that 'turn-key' contracts should be used whenever they are clearly in the best interests of the government." The committee also recommended that net floor area limits could be exceeded by as much as fifteen percent when turnkey procurement was used. The recommendation did not permit exceeding established cost limits under other types of construction contracts or any diminution of quality in housing obtained.<sup>41</sup> The limitation on net

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<sup>40</sup>U. S. House of Representatives, Committee on Armed Services, Hearings on Family Housing Authorizations for 1969, 90th Congress, 2nd Session, 1968, p. 8284.

<sup>41</sup>U. S. House of Representatives, Committee on Armed Services, Military Construction Authorization Fiscal Year 1970, 91st Congress, 1st Session, Report No. 91-386, 23 July 1969, p. 39.



floor area was later changed in 1973 decreasing the percentage from fifteen to five percent.<sup>42</sup>

(2) Committee on Appropriations

For several years prior to 1968, this committee had urged the DOD to utilize the turnkey concept for the construction of family housing projects. The committee report to the house stated:

"It is mystifying to the Committee why the Department of Housing and Urban Development has been able to utilize this method of construction successfully in programs for low-income housing, but that it has evidently presented almost insurmountable problems to the housing officials of the Office of the Secretary of Defense. Apparently however, some effort is being made in this direction and the Committee has been assured by the Assistant Secretary of Defense, Installations and Logistics, that certain 'turnkey' projects will be approved for construction in fiscal year 1969.... The Committee does not necessarily hold that this method of construction is a panacea for even a portion of the ills of the Defense housing program. It does feel, however, that it warrants more consideration and fewer roadblocks by the Office of the Secretary of Defense."<sup>43</sup>

c. Senate

(1) Committee on Armed Services

This committee as well as its counterpart in the House stressed the exploration of new contracting procedures in its report on the FY 1969 military family housing program. It was noted that although the FY 1969 program probably could be constructed within the limitation, new procedures and methods would be needed to avoid loss in quality of

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<sup>42</sup>U. S. House of Representatives, H.R.9005 Bill, 93rd Congress 1st Session, 1973, p. 37.

<sup>43</sup>U. S. House of Representatives, Committee on Appropriations, Report No. 90-1754, 90th Congress, 2nd Session, July 1968, p. 22.



construction. They observed that "potential cost savings inherent in turnkey contracting and simplified specifications "were being explored but it was readily apparent that new technology and housing construction methods would be necessary to retain adequate quality standards within reasonable cost limits.<sup>44</sup>

The following year, the committee refused to increase the family housing per unit statutory cost limitation. Their report stated that "good management, the elimination of gold-plating, and the use of new methods and techniques should at least partially offset the general rise in the costs of materials and labor." It was convinced that housing could be built under the normal ceiling if a resourceful effort was made and "all approaches - including turn-key" were exhausted.<sup>45</sup> In 1970, the committee reaffirmed its position using the exact same language.<sup>46</sup>

Based on the successful results experienced by HUD and DOD using turnkey construction contracting, the committee reported out to the Senate in 1973 an amendment to accommodate the

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<sup>44</sup>U. S. Senate, Committee on Armed Services, Report No. 90-1232, 90th Congress, 2nd Session, July 1968, p. 34.

<sup>45</sup>U. S. Senate, Committee on Armed Services, Military Construction Authorization for Fiscal Year 1970, 91st Congress, 1st Session, Report No. 91-527, November 1969, pp. 43-44.

<sup>46</sup>U. S. Senate, Committee on Armed Services, Military Construction Authorization Fiscal Year 1971, 91st Congress, 2nd Session, Report No. 91-1234, 24 September 1970, p. 62.



selected use of one-step competitive negotiation procedures (turnkey) in military family housing projects as an acceptable alternative to competitive award based upon the lowest responsible bid.<sup>47</sup> They were favorably impressed with the overall progress made toward reducing the costs of the military family housing construction program and the increased application of the turnkey procedure they had advocated. It was also observed through the increased use of the turnkey procedure significant design cost reductions of the Naval Facilities Engineering Command (NAVFAC) were achieved.<sup>48</sup>

(2) Committee on Appropriations

The Senate committee has been silent on the utilization of turnkey contracting in the armed services. Review of committee minutes and reports from FY 1968 through FY 1975 failed to find the committee's position on this subject.

2. Department of Defense

The DOD experimented with the turnkey concept at three bases in late 1968 in the hopes of attracting top builders and getting higher quality construction in military family housing.<sup>49</sup> Earlier, the

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<sup>47</sup> Military Construction Authorization Fiscal Year 1974, op. cit., p. 55.

<sup>48</sup> Ibid, p. 8

<sup>49</sup> "Pentagon Tries Turnkey Housing," Engineering News Record, Vol. 181, No. 12, 19 September 1968, p. 83.



House Appropriations Committee, in its report recommending the FY 1969 military construction appropriations bill, had urged DOD to try turnkey contracting for military family housing.<sup>50</sup>

DOD felt that many builders, particularly smaller residential contractors who didn't operate on a regional or national basis and who did not compete on contracts of the conventional bid basis, might be interested if they could propose on the basis of the product they customarily provided in the private sector. It was further believed that the contractors would bid for the entire project, design as well as construction. DOD would set forth performance specifications only, rather than having the contractor build to detailed government plans and specifications.

In the public announcement of this experiment, John J. Reed, Deputy Assistant Secretary of Defense for Family Housing stated:

"This procedure permits us to buy what the industry is producing without requiring that a builder customize his product. We want to test whether we can get better value by having homebuilders provide us a product they are routinely building for the private market. Our purpose with the turnkey procedure is to attempt to use local talent and in effect say, 'You built a nice house there; will you build 50 of them here for me on my property.' In choosing among the competitors, we will select the one who offers the most value to the government, not just the lowest price. Review boards in the field will make this choice on the basis of such factors as ingenuity of design, the materials to be used, the economics of construction and the amenities offered to the occupant."<sup>51</sup>

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<sup>50</sup>"Military Austerity-House Unit Chops Pentagon Building, Chides Planners," Engineering News Record, Vol. 181, No. 4, 25 July 1968, p. 21.

<sup>51</sup>"Pentagon Tries Turnkey Housing," op. cit., p. 83.



Mr. Reed added that turnkey is a more difficult method of procurement because it is easier to take the low bid than to apply quality judgments. Turnkey does however, permit the government to put greater emphasis on quality, reduce its inspectors, and to cut the time and costs involved in preparing plans, specifications, and bidding procedures.<sup>52</sup>

The DOD approach and historical overview of this procurement concept is further discussed and evaluated in Chapters IV and V.

### 3. Department of Health, Education and Welfare

The Department of Health, Education and Welfare (HEW) had not used the turnkey concept in the construction of its facilities. It has previously used the conventional method of construction and in addition to this method, is presently using the Construction Manager (CM) concept in awarding contracts.

A CM is an engineer who works with an owner and architect to formulate the project design, furnish the architect with the latest construction technology and market conditions to insure that a design stays within a budget. The CM also manages the procurement effort, inspects the construction of a project and, when requested, provides a wide range of other services.

In 1972, HEW awarded the first CM contract by the Federal government requiring the CM to guarantee the project's final cost.<sup>53</sup> The

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<sup>52</sup>Ibid, p. 83.

<sup>53</sup>"HEW Lets First CM Job Requiring Cost Guarantee," Engineering News Record, Vol. 188, No. 11, 16 March 1972, p. 55.



technique employed by the CM was to let all construction work to sub-contractors on a competitive bid basis. If the successful prices totaled less than the guaranteed price, that sum became the guaranteed maximum price (GMP). When bids exceeded the GMP, the CM had the option of rejecting all bids and seeking new ones.

#### 4. Department of Housing and Urban Development

In 1966, the Department of Housing and Urban Development (HUD) initiated the use of the turnkey technique for obtaining public housing. A 10-story, 343 unit high-rise residential structure in Washington, D.C., named Claridge Towers, was constructed under the provisions of the Housing and Urban Development Act of 1965. Upon completion of the construction, the builder delivered the keys to the Local Housing Authority (LHA), hence the term "turnkey."<sup>54</sup> This was the first known Federal government use of this concept in construction contracting.

When HUD made the decision to use turnkey, it recognized the need to streamline its internal procedures so that developers would not be delayed while waiting for government decisions. A new organization, the Production Division, was established with the responsibility for expediting action on turnkey programs. The division operates in the field offices and individual projects are assigned to a field expeditor who follows that project from inception to completion.<sup>55</sup>

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<sup>54</sup> HUD Second Annual Report, op. cit., p. 44.

<sup>55</sup> General Services Administration, Public Buildings Service, Construction Contracting Systems-A Report on the Systems Used by PBS and Other Organizations, March 1970, p. 3-26.



HUD provides housing for low-income families using the following methods: (a) low-rent public housing, (b) homeownership for low-income families and (c) housing for low-income families provided through private sponsorship.<sup>56</sup> In addition to new construction by the conventional technique, purchase of existing housing and the leasing of structures, HUD employs variations of the turnkey concept as follows:<sup>57</sup>

1. Turnkey-new construction.
2. Turnkey-rehabilitation.
3. Turnkey III.
4. Accelerated Turnkey Program.

The sequence of steps for Turnkey-new construction are:<sup>58</sup>

1. Advertisement by the LHA for turnkey construction.
2. Evaluation of proposals by the LHA and the HUD area office.
3. Selection of the turnkey contractor.
4. Approval and appraisal of the proposed site.
5. Feasibility conference during which agreement is reached on the project design and the price of the land.

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<sup>56</sup>U. S. Department of Housing and Urban Development, Low Rent Housing Guide Orientation to the Program, HM G 7401.3, April 1971, Chapter 5, pp. 1-5.

<sup>57</sup>Ibid, pp. 1-5

<sup>58</sup>U. S. Department of Housing and Urban Development, Low-Rent Public Housing Turnkey Handbook, HM G 7425.1, October 1973, pp. 1-2, 1-3.



6. Developer's preparation of preliminary drawings and outline specifications.
7. Review of preliminary documents and preparation of cost estimate by HUD.
8. Negotiation conference during which a price for improvements is agreed upon.
9. Preparation of the LHA Development Program.
10. Execution of the Annual Contributions Contract between the LHA and HUD and the execution of the Preliminary Contract of Sale by the LHA, the developer and HUD.
11. Developer's preparation of working drawings and specifications and their review and approval by the LHA and the HUD area office.
12. Submittal of such working drawings and specifications for updated cost estimates.
13. Execution and approval of the Contract of Sale between the developer and the LHA.
14. Start of construction.

The same steps are followed for Turnkey-rehabilitation of an existing house or other property requiring substantial alteration, repair or improvements. Multifamily housing is eligible for turnkey-rehabilitation contracting when the rehabilitation cost is 20 percent or more of total replacement cost and 25 percent or more for single family housing.<sup>59</sup>

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<sup>59</sup>Low-Rent Housing Guide Orientation to the Program, op. cit., Chapter 5, p. 1.



Turnkey III enables a low-income family residing in a dwelling unit owned by the LHA to acquire ownership of it during its tenancy by (1) making monthly payments to the LHA credited to a homebuyers reserve account, based on a percentage of his income, and (2) providing repair and maintenance of the home. When a family's income, assets and reserve account increase to a point where it is capable of obtaining available conventional or FHA financing, the family is required to purchase the home.<sup>60</sup> The first use of this concept by HUD occurred in North Gulfport, Mississippi in 1969.<sup>61</sup>

The Accelerated Turnkey Program (ATP) provides a selected developer the option of submitting his working drawings and specifications at the time of or immediately after his selection rather than waiting until the approval of the preliminary contract of sale. The procedures are similar to those previously discussed for Turnkey-new construction except a Feasibility Conference is not held and other steps are combined thereby decreasing the time period prior to execution of the Contract of Sale with the LHA.<sup>62</sup> This streamlining of the regulations was initiated in 1969.<sup>63</sup>

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<sup>60</sup>Ibid, p. 3.

<sup>61</sup>U. S. Department of Housing and Urban Development, HUD News Feature, HUD-No. 69-0577, 12 July 1969, p. 3.

<sup>62</sup>Low-Rent Public Housing Turnkey Handbook, op. cit., p. 1-2.

<sup>63</sup>"Snipping Red Tape," Engineering News Record, Vol. 182, No. 9, 27 February 1969, p. 21.



HUD's use through 1969 with the turnkey program was reflected by applications being sought for 127,586 units using turnkey out of a total 418,126 units.<sup>64</sup>

HUD has also attempted to develop prototypes of innovative housing systems in Operation Breakthrough. This attempt was initiated by the then Secretary, George Romney, with the intention of cutting away impediments to more and lower cost housing by employment of mass-production techniques.<sup>65</sup> The results of this experiment have not been evaluated.

#### 5. Environmental Protection Agency

The Environmental Protection Agency's initial use of turnkey contracting was met with strong protests by the Water Pollution Control Federation (WPCF) and the Consulting Engineers Council (CEC).<sup>66</sup> The EPA proposed on September 1971 in the Federal Register the use of Federal grants to municipal governments that would permit turnkey construction contracts for waste treatment projects. Modifications of the regulations were intended by the EPA to:

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<sup>64</sup>Ibid, p. 21.

<sup>65</sup>"Federal 'Breakthrough' Program Spurs Innovation in U. S. Housing Technology," Civil Engineering, Vol. 40, No. 9, September 1970, p. 73.

<sup>66</sup>"WPCF and Consultants Blast EPA on Turnkey Proposal," Engineering News Record, Vol. 187, No. 16, 14 October 1971, p. 13.



1. Save time getting treatment plants under construction and completed.
2. Relieve the paper work at the state and Federal levels.
3. Utilize new treatment methods.
4. Assure treatment plant operations meet specified performances.

The EPA Administrator, William D. Ruckelshaus, extended the hearings on the proposed regulations by 45 days and at the same time emphasized that the turnkey contract regulation was a new tool to abate pollution not as a substitute to the traditional consultant-contractor-owner system.<sup>67</sup> It was emphasized that the turnkey plan would be optional but many of the CEC and WPCF were of the opinion it would have been made standard practice.<sup>68</sup>

Political interest was focused on the EPA proposal and comments filed with the EPA generally opposed the EPA position. Some major design-construction firms favored the proposal arguing that the turnkey approach had proven itself in industrial applications.<sup>69</sup>

In addition to implementing the turnkey concept for sewage treatment plants, the EPA employed Bechtel, Inc., to evaluate the concept.

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<sup>67</sup>Ibid, p. 13.

<sup>68</sup>"EPA's Turn-Key Proposal Draws Fire," Consulting Engineer, Vol. 37, No. 5, November 1971, p. 126.

<sup>69</sup>"Turnkey Flap May Flip EPA's Opinion," Engineering News Record, Vol. 187, No. 20, 11 November 1971, p. 15.



Their report reached the conclusion that "single-responsibility leadership of 'design and construct' projects had the best chance of achieving the desired benefits of shorter completion time, lower cost, improved performance, and increased application of new technology."<sup>70</sup>

On 1 July 1974, the GAO ruled that the EPA was no longer permitted to use turnkey contracts in construction of the treatment plants under the Federal Water Pollution Control Act as amended by Congress. The GAO ruling stated that Congress intended that the EPA should divide the grants, with the step 2 grant paying for plans, specifications and estimates and the step 3 grant for construction. GAO concluded that approximately 200 grants for projects already awarded under the turnkey method would continue in effect.<sup>71</sup>

#### 6. General Services Administration

For civilian agencies of the Federal government, the General Services Administration-Public Buildings Service (GSA-PBS) is the central procurement authority for the construction of all general-purpose public buildings. This includes site acquisitions, A-E services and the overseeing of design, construction, extension and remodeling of public buildings. The civilian agencies utilize the services of GSA-PBS for

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<sup>70</sup>"ACEC Comments-The Advantages of Turnkey-Plus," Consulting Engineer, Vol. 42, No. 4, April 1974, p. 22

<sup>71</sup>"Grants:EPA May Not Award Design and Construction Steps of Water Pollution Facility in Single Grant," Federal Contracts Report, No. 539, 15 July 1974, pp. A-5 through A-7.



general purpose building construction but may procure their own construction for special purposes related to their basic missions. Previous cited examples of special purpose facilities in this chapter included HEW, HUD and the EPA.

In September 1968, the GSA Administrator, P. B. Knott, Jr., initiated a study to identify the alternative methods of contractor selection and types of contracts which would be most advantageous for the construction of public buildings.<sup>72</sup> The final report with conclusions and recommendations discussed construction from the pre-design phase through design, construction, management, and alternative construction contracting systems. In summary, the study group recommended that three systems be used by the GSA-PBS. These systems are:<sup>73</sup>

1. A modified sequential design-bid-construct system, a modification to the conventional method.
2. Construction manager (CM) system.
3. Turnkey system.

A fourth system, buildings systems, was experiencing technical and contractual problems and was not sufficiently resolved to permit evaluation. This system attempts to combine the construction, materials and product industries in creating completely integrated factory constructed

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<sup>72</sup>Construction Contracting Systems, A Report on the Systems Used by PBS and Other Organizations, op. cit., p. 1-1, Appendix F.

<sup>73</sup>Ibid, p. 7.



building subsystems and field assembly. The study group did recommend early completion of a building systems project.

In the first system, the recommendation was to make major modifications to the present sequential system and to use on other than major projects. This included use of concurrent design review, shortened design and construction schedules, and a project manager. They recommended that the construction manager (CM) system be utilized for multi-story office buildings, complex design projects, and other projects costing over \$5 million. It was concluded by the group that turnkey could provide significant benefits for certain projects and their recommendation was to use turnkey experimentally on simple design projects.

The hesitation on wholly endorsing the turnkey concept was provided in their detailed discussions.

"In the case of a complex building requiring numerous technical decisions during design and construction, this system could prove difficult to administer because of inherent conflict between the PBS desire for high quality and the developer's motivation to reduce the quality in order to stay within the budget. Accordingly, it does not appear desirable to use the turnkey system on complex buildings until further experience has been developed."<sup>74</sup>

The study group prepared and included in their final report detailed procedures and contract documents enabling GSA-PBS to use the turnkey system experimentally. They concluded that continued experimentation with turnkey should be conducted in order to demonstrate its feasibility.

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<sup>74</sup>Ibid, p. 4-27.



In November 1971, GSA published its invitation for proposals on a turnkey project involving five small district Social Security Office buildings in Illinois and Wisconsin. One month later, they had received over 200 responses<sup>75</sup> and when the unpriced proposals were received, GSA had received a total of 420 submittals.<sup>76</sup>

GSA is convinced that construction input into the design phase of the project cycle, now recognized as a past omission, will be stressed. Further, future trends include overlap of design and construction, packaging of separate construction contracts, introduction of government project managers (PM), and increased utilization of the construction manager (CM) system. The evolution of GSA's experience and studies has culminated in their system for Construction Management encompassing phased construction, separate construction contracts, project manager, and construction manager. They have described this CM system as "a triumvirate of owner, architect-engineer, and construction manager.... to cooperatively plan, design, and construct GSA's increasingly complex buildings. This is a team with no prime participant, only indispensable members working side by side."<sup>77</sup>

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<sup>75</sup>"GSA Launches Its First Turnkey Building Job," Engineering News Record, Vol. 187, No. 23, 2 December 1971, p. 13.

<sup>76</sup>"GSA: Progress on CM, Turnkey, Financing," Engineering News Record, Vol. 188, No. 4, 27 January 1972, p. 45.

<sup>77</sup>General Services Administration, Public Buildings Service, The GSA System for Construction Management, April 1974, p. 2.



#### IV. MILITARY SERVICES APPROACH

##### A. HISTORICAL OVERVIEW

In the 1960's, the Department of Defense was tasked to "buy at the lowest sound price," in effect ordered from noncompetitive to competitive procurements and, more specifically, from CPFF to fixed price or incentive contracts.<sup>78</sup> The purpose was to provide more incentive to contractors to improve performance and also to lower costs.

Congressional interest in turnkey construction was heightened by GAO reports and HUD's success in low-cost family housing procurement.<sup>79</sup> In 1967, the traditional method of design-bid-build contracting of military family housing for eligible officer and enlisted personnel was recognized as not meeting project objectives. This was manifested in,<sup>80</sup> (1) the necessity to accept, by bid item, projects of less than optimum quality and livability within funding constraints, (2) failure to attract competition among contractors experienced and adept at family housing construction, and (3) the necessity to completely redesign or materially modify plans

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<sup>78</sup> Meyerson, Martin, "Price of Admission into the Defense Business," Harvard Business Review, Vol. 45, July-August 1967, p. 113.

<sup>79</sup> See Chapter III for additional discussion of GAO and HUD evaluations of turnkey.

<sup>80</sup> Naval Facilities Engineering Command, Turnkey Use for Construction of Navy Family Housing, discussion paper, 5 November 1971, pp. 1-2.



and specifications and then readvertise projects in order to obtain a contract within available funds. It was recognized both by Congress and the DOD that houses and site development were not unique unto the military. A method of procurement was necessary wherein the expertise of the commercial home builder could be applied toward the objective of obtaining optimum quality housing within established funding levels.

In September 1967, GAO forwarded a draft report to the DOD and recommended re-evaluation of its military construction practices and procedures and suggested the use of the turnkey concept for the construction of family housing.<sup>81</sup> In response to this report, the Navy did not concur with GAO's conclusion that military housing was over-designed or over-inspected.<sup>82</sup> However, the Navy did concur with the GAO in re-evaluating military construction practices and procedures and to consider the turnkey concept in construction of family housing.

Secretary of Defense, Robert S. McNamara, agreed to try the turnkey concept with one project for each of the three military services. The final site selected by the Air Force was at Ent Air Force Base,

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<sup>81</sup>"Military-Housing Quality Faulted," op. cit., p. 74

<sup>82</sup>U. S. Department of the Navy, Assistant Secretary of the Navy (Installations and Logistics), memorandum for Assistant Secretary of Defense (I&L), Subject: GAO Draft Report on Comparison of Cost and Quality of Military Family Housing with Private Housing (OSD Case No. 2673), 9 November 1967, enclosure 1, pp. 1-3.



Colorado Springs, Colorado; the Army chose Fort Monmouth, New Jersey, and the Navy selected a 36 unit family housing project at Oak Knoll Naval Hospital, Oakland, California.<sup>83</sup> The Navy elected to utilize the one-step negotiated turnkey process while the Air Force and Army chose the two-step formally advertised competitive bid turnkey form.

The Navy's first turnkey military housing contract was awarded on 5 February 1969 to Trans-Bay Engineers and Builders, Inc., of Oakland, California for the 36 units.<sup>84</sup> At the time of the award, Commander D. G. Wilson, Director of the Family Housing Construction Division, Naval Facilities Engineering Command stated, "this type of contract has great promise in the family housing construction area and enables the military services to take advantage of the contractor's 'expertise' in this type of construction."<sup>85</sup> By 1 July 1969, the Navy had awarded five turnkey projects at these locations; Oakland, California; Philadelphia, Pennsylvania; Boston, Massachusetts; Northwest Cape, Australia; and Fallon, Nevada.<sup>86</sup> Since the initial award, the use of

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<sup>83</sup> "Pentagon Tries Turnkey Housing," op. cit., p. 83.

<sup>84</sup> "First 'Turn-Key' Project Awarded to Multi-Racial Group," Navy Civil Engineer, Vol. 10, No. 3, March 1969, p. 22.

<sup>85</sup> Ibid, p. 22.

<sup>86</sup> "Turn-Key Housing," The Military Engineer, Vol. 61, No. 403, September-October 1969, p. 354.



turnkey contracting has steadily increased as shown in the following figures on the Navy's use of the one-step negotiation turnkey method.<sup>87</sup>

Figure 1

Fiscal Year	Total Units Approved	Units Constructed/ Programmed by Turnkey	Percent
69	750	510	68
70	1540	592	38
71	3250	1950	60
72	4180	2144	51
73	3830	3090	81
74	3460	2855 (a)	83
75	3900 (b)	2800 (c)	72
Total	20910	13941	67

(a) Excludes 100 additional units at New Orleans.

(b) Proposed.

(c) Excludes 700 units in Hawaii and 400 units overseas.

In spite of its initial success in the Oak Knoll project, the Navy has since determined that considering contractor interest and proposal quality it is best to utilize conventional design-advertise-award contract methods involving less than 100 units. Close analysis is also required for projects between 100 to 200 units.<sup>88</sup>

Both the Army and Air Force initially used the two-step turnkey method for family housing construction.<sup>89</sup> The Army has had much

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<sup>87</sup>Mr. Y. Boswell, Naval Facilities Engineering Command, interview held on 6 August 1974.

<sup>88</sup>Ibid.

<sup>89</sup>See subparagraph C in this chapter for a detailed discussion on two-step contract procurement.



experience in the execution of Military Construction Air Force (MCAF) projects including Air Force family housing projects. They have also used turnkey two-step for such projects as incinerators, guest quarters, bachelor housing, and commissary stores. Only recently has the Army begun to use the one-step turnkey concept for family housing. The Air Force initially was a strong proponent of the two-step method. Their general aim under this method was to reduce the effort of the bidders, simplify evaluation, and to provide a floor level of quality. It was recognized in late 1970 by the Air Force that the two-step process provided the lowest quality within their acceptable range.<sup>90</sup>

The Air Force started, in 1971, a systems built housing program in conjunction with the two-step turnkey procurement method to design and construct 23 projects including housing, school, warehouse and office building structures on 20 Air Force bases. After completion of this pilot program, the evaluating A-E firm in addition to identifying the systems built method as a fragmented segment of the construction industry, proposed for future construction the one-step turnkey procurement process with the award going to the firm with the best product for the money and not necessarily the lowest bidder.<sup>91</sup>

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<sup>90</sup>Department of the Navy, Naval Facilities Engineering Command, "A Report of Turnkey Procedures for Navy Family Housing Construction," February 1971, Appendix I, p. 3.

<sup>91</sup>"Systems Building Program for Air Force Rapped," Engineering News Record, Vol. 191, No. 2, 12 July 1973, p. 12.



Recent reports indicate that the Air Force has reduced their reliance on the two-step turnkey concept and are extensively using the one-step method for their family housing program. It was first used by the Air Force on a wide scale in the FY 1972 program and is being applied extensively in the FY 1973 and 1974 programs.<sup>92</sup>

In Fiscal Year 1970 military construction authorization hearings before the Senate Armed Services Committee, the DOD requested authorization to enter into installment payment contracts providing for private financing and construction of housing on land in Japan and the Philippines under U. S. control.<sup>93</sup> The contracts were to be awarded on the turnkey basis with monthly payments on an installment basis after construction of the unit. At the end of the contract term, the housing would have been owned outright by the U. S. government. The Committee disapproved the request because, (a) it would have created a liability of \$200 million, (b) such a program was not warranted in view of uncertainties as to future military force levels, and (c) the proposal could have constituted "another maverick housing program."<sup>94</sup>

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<sup>92</sup>"The Cannon Experience - One Step Turnkey Housing," Air Force Civil Engineer, Vol. 15, No. 3, August 1974, p. 21.

<sup>93</sup>U. S. Senate, Committee on Armed Services, Military Construction Authorization for Fiscal Year 1970, op. cit., p. 46.

<sup>94</sup>Ibid, p. 46.



## B. LEGAL BASIS

The specialized nature of procurement for the Armed Services is prescribed by law under Chapter 137 of Title 10, United States Code (U.S.C.), which codified the Armed Services Procurement Act of 1947. The DOD procurement is governed by the Armed Services Procurement Regulations (ASPR).

Under the traditional method of contracting, procurement is accomplished based on the formal advertising procedures of the ASPR section II. This method involves the posting of Invitation for Bids, submission of sealed bids by interested prospective contractors, review of bids to determine that the low bidder is responsive and capable of performance and then contract award to the low bidder when his bid is within the statutory limitation.

Section XVIII of the ASPR is devoted to construction and A-E contracts. The provisions of other parts of the ASPR are also applicable to construction contracts except in cases where they are inconsistent with the provisions of Section 18. In those cases, the provisions of Section 18 shall apply when construction is involved.<sup>95</sup>

This section is not inconsistent with other sections of ASPR in the prescribed method of contracting. The ASPR provides that all contracting for construction and supplies or services must be made by formal advertising unless negotiation is specifically authorized by

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<sup>95</sup> ASPR, op. cit., p. 18:1.



statute.<sup>96</sup> In the procurement of construction, the ASPR states:

"Generally, contracts for construction shall be formally advertised and be of the firm fixed-price type."<sup>97</sup>

The requirements of the ASPR that prescribe the use of the formal advertising method of procurement are for construction contracts based not only on Chapter 137, Title 10 of the U.S.C., but also on the provisions of other applicable legislation such as the annual Military Construction Authorization Act.<sup>98</sup>

When the three services commenced usage of the turnkey concept in FY 1968, the Navy developed a one-step concept which NAVFAC counsel considered justifiable.<sup>99</sup> This position was justified under the provisions of 10 U.S.C. 2304 (a), subsection (10), "the purchase or contract is for property or services for which it is impracticable to obtain competition" as implemented by the ASPR 3-210.2 example (xiii), "when it is impossible to draft for a solicitation of bids, adequate specifications, or any other adequately detailed description of the required supplies or services."

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<sup>96</sup>Ibid, Section 18-102, p. 18:2.

<sup>97</sup>Ibid, Section 18-201, p. 18:8

<sup>98</sup>Ibid, Section 18-102, p. 18:2.

<sup>99</sup>Department of Defense, Naval Facilities Engineering Command, point paper, Family Housing Contracts Justification for Turnkey Negotiations, 18 May 1971, p. 2.



The counsel reasoned that adequately detailed specifications could not be drawn for the turnkey method and that its very essence was an attempt to stimulate builders to exercise their own ingenuity to provide the best housing solution for the Navy. He further reasoned that the solutions of the several proposers should be quite different and they should be encouraged to be different. Therefore, the several proposals should not be reduced to a common denominator for evaluation solely on the basis of the lowest price.<sup>100</sup>

A counter argument to the one-step method is that negotiation cannot be justified on the basis of the quality of the project. NAVFAC counsel agreed that those decisions did not preclude consideration of quality in making an award where justification for negotiation existed apart from the need for a quality product. In fact, the counsel noted, the ASPR 3-101 (iii) expressly provided for consideration of quality in the negotiating process not only for the housing construction but also the design by an A-E.<sup>101</sup>

The Air Force original use of turnkey contracting was formulated on a two-step method using the Formal Advertising procedures of the ASPR as outlined in section 2-102.1. This method, further discussed in paragraph D of this chapter, adheres to the traditional method of

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<sup>100</sup>Ibid, p. 2.

<sup>101</sup>Ibid, p. 3.



procurement including invitation for bids , contractor submission of sealed bids , determination of responsive bids and contract award to the lowest bidder when such a bid is within the appropriation ceiling .

The Army used both one- and two-step turnkey contracting for their housing projects and as the contracting and construction agency for the Air Force utilized the two-step method . The Army for its own programs and for Air Force programs is now adhering to the one-step method for family housing and the two-step concept for other military construction projects that adhere to current DOD policy on turnkey contracting .

#### C. ONE-STEP NEGOTIATION

In general terms , projects which are repetitive in the commercial market and can be specified to comply with either FHA minimum property standards (MPS) or other industry standards can qualify for one-step turnkey contracting .

After command approval for use of the one-step turnkey procedure , a request for proposal (RFP) is prepared establishing the scope of the project , dollar target , site plans with topography and subsoil conditions , utility services and a complete description of the terms of the contract including the ground rules for submission , evaluation and selection of a proposal . Information about security and performance bonds , and the usual general and special provisions are also enclosed with the RFP.<sup>102</sup>

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<sup>102</sup>Department of the Navy , Naval Facilities Engineering Command , Turnkey Procedures for Navy Family Housing Projects , NAVFAC Instruction 11101.85B , 10 October 1974 , enclosure 1 , pp. 2-3 .



The RFP is synopsized and published in the Commerce Business Daily and letters of solicitation are forwarded to those firms which have indicated an interest in past turnkey projects. Usually six to eight weeks are allowed for preparation of proposals. In addition to the widest distribution of the RFP, a pre-proposal conference is held at the project site and prospective bidders are invited to raise questions concerning the project, RFP, site and any other pertinent questions to aid them in preparing their proposal.

After examining the RFP and attending the pre-proposal conference, the prospective proposers receive identification numbers which are the sole identification of their proposals during the evaluation and selection process. Working with the guidelines contained in the RFP, the interested proposers submit a technical proposal and price. The proposals, when received, are reviewed for responsiveness to the RFP and the qualifications of the proposers submitting the proposals are verified. After all proposer identification markings and cost information are removed, technical evaluations of the proposals are made by a technical evaluation team.<sup>103</sup>

The technical evaluation team which is composed of registered professional engineers and architects examines each proposal in detail working with an evaluation system which covers site design, site engineering, unit design and unit engineering and specifications. The evaluation

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<sup>103</sup>Ibid, enclosure 1, p. 7.



system which is standard at all Navy Engineering Field Divisions (EFD's) is utilized to insure objectivity and ~~uniformity~~ in the evaluation and selection process. The technical evaluation team is assisted when necessary by special consultants. The members of the evaluation board see only the technical data and are not exposed to the proposed costs.

The technical evaluation board evaluates each conforming proposal in developing and assessing a numerical quality rating for each element of the firm's proposal.<sup>104</sup> In evaluating the site design, the board checks for site utilization and development, site integration, vehicular circulation, parking and pedestrian circulation, landscaping and recreation areas. In site engineering, the evaluation includes utility distribution systems including electrical, water, sanitary sewer, storm drainage and gas distribution; outdoor lighting, master TV antenna system, street system, parking and driveways, walkways, ground cover, irrigation, and soil treatment and fire protection. In the category of dwelling unit design, the evaluation focuses on dwelling unit types, net floor areas, exterior appearance, outdoor and indoor integration, general storage, vehicular storage, functional arrangement, living, sleeping, bathing, food handling and utility and work areas. The fourth category of dwelling unit engineering and specification, the board examines the engineering features of a unit including the foundation system, flooring system, exterior walks, interior walls and ceilings, roof system, windows and window coverings, doors including hardware,

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<sup>104</sup> Ibid, enclosure 3, pp. 1-29.



kitchens, bathrooms, interior plumbing and electrical systems, heating, patios, service yards, and fencing and any miscellaneous features.

The technical evaluation board report which includes a numerical score for each proposal as well as a narrative discussion is forwarded to the selection board. The board is briefed by the technical evaluation team leaders as to the results of the technical evaluation. After each board member is acquainted with the features of each proposal, the cost of each proposal is applied by means of a cost-quality ratio. This ratio which is calculated for each major alternate of each proposal is calculated by dividing the proposed price by the quality rating established during the technical evaluation (i.e.,  $\text{proposal price} \div \text{quality rating} = \$/\text{point}$ ).<sup>105</sup>

The selection board takes all of the data under consideration, including total cost, points, design features and cost-quality ratio, to determine which proposals in their judgment offer the most to the government. The board deliberations are documented and forwarded with a recommendation for award of a contract to the selected proposer. When it is not feasible to make an award on the basis of the proposal received, negotiations with the offerors may be conducted.<sup>106</sup>

Upon approval of the selection board report, a preaward survey and Equal Employment Opportunity (EEO) check are conducted and higher authority clearances obtained. A contract is then awarded and design is

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<sup>105</sup> Ibid, enclosure 1, p. 10.

<sup>106</sup> Ibid, enclosure 1, p. 11.



normally completed within 120 days. The construction phase of the contract may be expedited by incremental approval of the design to permit site work and placement of orders for long lead time items.<sup>107</sup>

#### D. TWO-STEP FORMAL ADVERTISING METHOD

Utilization of two-step procurement for construction is considered appropriate in (1) situations conforming to those described in ASPR 2-502, and (2) where it is possible to prescribe, through the use of performance specifications, readily available commercial products and/or expertise that satisfies the project requirements.<sup>108</sup>

Under this method, an RFP is issued in a manner similar to the one-step process with the exception that a price proposal is not solicited until the second step. After a proposer submits a technical proposal without pricing, they are evaluated by a technical evaluation board. The Army evaluates the proposals on the categories of durability, utility and aesthetics,<sup>109</sup> while the Air Force evaluates them as to acceptable,

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<sup>107</sup> Ibid, enclosure 1, p. 14.

<sup>108</sup> Assistant Secretary of Defense, Installations and Logistics memorandum Serial 9-3017, Subject: DOD Policy and Procedural Guidance for the Use of One Step Competitive Negotiation (One Step) and Two Step Formal Advertising (Two Step) Procurement Procedures in the Acquisition of Facilities, 27 November 1972, p. 2.

<sup>109</sup> A Report of Turnkey Procedures for Navy Family Housing Construction, op. cit., Appendix I, p. 1.



susceptible to acceptable and nonacceptable.<sup>110</sup> The second step then involves the issuance of invitation for bids to those contractors whose proposals are acceptable. Contract award is then made to the lowest responsible bidder provided it is below the appropriation ceiling. Predesign conferences, design submittals and construction are similar to those previously discussed for one-step turnkey contracting.

#### E. POLICY AND GUIDANCE

In September 1971, Mr. Edward J. Sheridan, indicated that experience on projects accomplished by the turnkey procedures had not been conclusive and the results of the turnkey procurements would continue to be evaluated.<sup>111</sup> In view of the uncertainties at that time, the turnkey construction program for family housing construction was approved on a case-by-case basis. Mr. Sheridan stated that it was "not the intent of the Department of Defense to approve an across-the-board development of any Departmental program via turnkey."<sup>112</sup>

One year later, Mr. B. J. Shillito, the Assistant Secretary of Defense, Installations and Logistics found it necessary to establish a clear policy

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<sup>110</sup> Ibid, Appendix I, p. 3.

<sup>111</sup> Assistant Secretary of Defense, Installations and Housing, memorandum, Subject: FY 1972 Family Housing Program-Project Development, 24 September 1971, p. 1.

<sup>112</sup> Ibid, p. 2.



with the Congress on the DOD use of one- and two-step procedures.<sup>113</sup>

This policy to the three services was directive in nature and identified specific types of facility projects that were determined to be suitable for use of either one- or two-step turnkey procedures. It also required both the project sponsor and the construction organization to consider the use of the turnkey procedures in the identified categories as an alternative to the traditional method of design and construction contracting. The centralized control provision was not intended to restrict or restrain initiatives to expand the cited applications but was intended to preclude duplication of effort and to communicate lessons learned in alternative applications to other departments.

The project types considered suitable for one-step competitive procurement procedures included the following:<sup>114</sup>

1. Family housing-new construction.
2. Temporary lodging facilities including temporary lodging quarters, Navy lodges and guest houses-new construction.
3. Bowling alley-new construction.
4. Swimming pools-new construction.
5. Industrial lighting projects.
6. New construction of building system proposals such as BOQ's, BEQ's or small training and administration buildings.

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<sup>113</sup> ASD (I&L) memorandum Serial 9-3017, op. cit., p. 2.

<sup>114</sup> Ibid, Tab A, p. 1.



The list for the two-step turnkey procedure included:<sup>115</sup>

1. Industrial type facilities.
  - a. Packaged type power plants.
  - b. Packaged sewage treatment plants.
  - c. Incinerators.
  - d. Standard commercial small general purpose hangars and other aircraft shelters.
  - e. Standard commercial small warehouses and cold storage facilities.
  - f. Equipment and/or process system installation and associated interior utility systems for major ships or depot repair facilities and industrial plant projects.
  - g. Bowling alleys
2. Miscellaneous industrial type projects.
  - a. Sprinkler and deluge systems.
  - b. Electrical switchgear and substations.
  - c. Boiler conversions.
  - d. Small air-conditioning projects.
  - e. Interior fire detection systems.
  - f. Standard commercial storage tanks.
  - g. Automated material handling systems.
3. Conditional cases.

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<sup>115</sup>ibid, Tab A, pp. 2 and 3.



a. Facility types with utilization of performance specifications to accommodate building system components.

b. Commissaries.

Mr. Shillito finally concluded that it was not necessary at that time to issue a DOD instruction but rather to use the guidance as an interim measure and increase both experience and education on the use of one- and two-step turnkey procurement techniques. In conjunction with the guidance, procedural procurement instructions developed by a Tri Service/OSD study group were to be submitted to the ASPR Committee for incorporation in ASPR Section 18. Efforts were also initiated to obtain Congressional authority to use one-step turnkey in the acquisition of all military construction (MILCON) and family housing projects.<sup>116</sup>

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<sup>116</sup>A DOD sponsored amendment to Section 604 of the FY 1974 MILCON authorization bill, authorizing one-step turnkey for all facilities was disapproved by the Joint Conference Committee Report No. 93-634.



## V. EVALUATION OF TURNKEY

### A. IMPACT ON CONTRACTORS

As contrasted with the traditional design-bid-award-construct approach to construction procurement, an alternate method is to contract with one firm for both the design and construction, making one contractor responsible for the entire project. This method, known as "turnkey" construction, has seen increasing usage in recent years in commercial practice. In previous years, this concept was used extensively in the chemical and petroleum industries by package contractors or process engineer-constructors.

A review of the construction industry's experience with turnkey is best reflected in the past data of the top 400 construction firms, including those who design and construct, as annually tabulated by the trade magazine, Engineering News Record.

Figure 2

Calendar Year	Total Contracts for Design-Construction (\$bil)	Total Contracts (\$bil)	Percentage
1965	6.4 (excludes 2.6 overseas)	19.0	34
1966	6.6	21.9	30
1967	6.8	24.4	28
1968	8.7	28.6	30
1969	10.9	33.4	33
1970	9.8	32.4	30
1971	11.1	36.0	31
1972	13.6	40.0	34
1973	20.5	55.0	37



The design-construction firms were ranked by contract volume including design only contracts valued at their estimated project cost.

Mr. John T. Gallagher in analyzing fixed-price design and construction (turnkey) contracts observed that they were very definitely a function of the general level of business activity.<sup>117</sup> Contractors were not favorably disposed toward preparing competitive bids on fixed-price projects when their workload was heavy due to high bid preparation costs and the inflationary risk associated with lump-sum work. Mr. Gallagher conducted a review of the general economic indicators and observed that during periods of slow economic growth, bidding on fixed-price projects by design-construction firms was extremely heavy.

A review of figure 2 supports this position. Between 1965 and 1972, the percentage of contracts awarded to design-construction firms stayed in the low 30 percent region, while in 1973, a period of slow economic growth, design-construction firms substantially increased their percentage for receiving contracts.

The increased adoption of turnkey construction both by the construction industry and the Federal government, primarily HUD and DOD, has not been without growing pains. When viewed by contractors, the solicitation, proposal, evaluation and contractor selection process has

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<sup>117</sup>Gallagher, John T., op. cit., p. 218.



been too cumbersome, too costly and too demanding.<sup>118</sup> Cumbersome and demanding in the sense that contractors find the RFP bid submittal an exhausting experience, locating sections within the RFP is difficult and many contractors lack understanding of the federal procurement process. The contractors find that to be fully responsive to all the prescribed terms and conditions prescribed in the RFP, they incur considerable expenses.

The DOD has made many improvements to the RFP and through increased usage of turnkey has decreased the review-award time. Interviews conducted by the Western Division, NAVFAC, of ten construction firms in 1971 revealed that the costs of preparing a turnkey proposal was approximately 80 to 100 percent higher than conventional contracting on projects in the two to four million dollar range.<sup>119</sup> However, seven of the ten contractors sampled did not consider the proposal preparation costs exorbitant, and indicated a favorable reaction to, and a preference for, turnkey over conventional bidding.

The construction industry magazine, Constructor, reported in 1969, "At its best, turnkey construction represents the ultimate in team approach, in which the contractor, who in turnkey construction is more properly called

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<sup>118</sup>"Contract Policy: Solicitation, Evaluation, Source Selection Process Seen as Too Cumbersome, Costly," Federal Contracts Report, The Bureau of National Affairs, No. 474, 2 April 1973, pp. A-2, A-3.

<sup>119</sup>Department of the Navy, Western Division, Naval Facilities Engineering Command, Memorandum, Code 056A, 19 May 1971, p. 1.



the contract manager, works with the architect right from the time the owner says he wants a building, thus bringing into play all the skills possessed by the seasoned contractor, not just his building skills."<sup>120</sup> The outstanding feature of turnkey is that it entails a single point of responsibility for every project.

In 1969, the Associated General Contractors of America (AGC) released the results of a survey showing that 658 or 85 percent of 781 building construction members responding to a questionnaire reported they perform turnkey construction. The chairman of the AGC Turnkey Construction Committee, Mr. Joseph L. Padgett, reported that many contractors regard the turnkey concept as the trend of the future in the building construction industry.<sup>121</sup>

The favorable acceptance and future trends of turnkey contracting are attributable to the following advantages:<sup>122</sup>

1. Provides design competition without cost to the DOD.
2. Once the contract is signed, contractor assumes all risk from then on.
3. Contract awarded within fiscal constraints.
4. Provides single point of contact and undivided responsibility.

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<sup>120</sup>"Turnkey Construction:Trend of the Future?", Constructor, April 1969, p. 25.

<sup>121</sup>Ibid, p. 25.

<sup>122</sup>Westerhoff, Russell P., op. cit., pp. 32-33.



5. Permits earlier completion as design and construction can proceed concurrently.
6. Project cost is known through a bonded firm price.
7. Provides evaluation of multiple architectural and engineering designs with award based on price and value.
8. Contract extras are controlled and kept to a minimum.
9. Turnkey team provides interchange of information, operating efficiency and knowhow.
10. Designs prepared by experts in their fields with more value for the price.
11. DOD as the owner does not require a complete engineering staff to supervise the contract.
12. Turnkey contracting and contractor quality control (CQC) work in unison.
13. Results in better and faster construction thereby advancing the start-up date.

The disadvantages and opposing arguments in the use of turnkey contracting are:

1. Design and construction changes are costly.
2. Possible impairment of professional engineer, architect integrities.
3. Tendency to economize on design by standardizing.
4. Potential for increased costs due to lack of completed drawings.
5. Life cycle costs (LCC) may be greater.
6. Loss of contract control by the DOD after award.



7. Local contractors and suppliers are usually eliminated.
8. Contracts may be inflexible.
9. Facility design may not provide for future expansion.

## B. COST ANALYSES AND REPORTS

### 1. General Accounting Office

The GAO was the initial catalyst in Congressional interest being focused on the use of turnkey contracting by the DOD. The initial review of military family housing, wherein GAO suggested a number of steps to help in obtaining the maximum value for military housing was contained in a 1967 report to the Department of Defense.<sup>123</sup> Their study of a military base housing complex cited three areas of higher costs when compared to adjacent private housing. The reasons stated for the higher costs were:

1. FHA and industry standards were more economical than military construction standards.
2. Inspections were more frequent and rigid than those in which industry was accustomed to under FHA standards.
3. Wage and labor rates at some locations on government contracts were higher than those prevailing in the area for private housing construction.

In 1971, GAO examined three locations where the DOD had used the turnkey concept.<sup>124</sup> It was found that it cost less to use the turnkey

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<sup>123</sup>"Military-Housing Quality Faulted," op. cit., p. 74.

<sup>124</sup>GAO Letter B-170403 to ASD (Comptroller), op. cit., p. 1.



method in family housing construction. GAO found the estimated savings, which ranged from \$36,000 to \$148,000, were realized without significant loss of quality or features normally found in conventional housing. The favorable report suggested two changes in the DOD turnkey procurement criteria. These were:

1. Selecting sites that did not require unusual or extensive development work.
2. Revealing in the RFP, the relative weights to be assigned cost and quality factors in addition to clarification on proposal evaluations.

2. Assistant Secretary of Defense-Comptroller

A recent review was made at the request of the Deputy Assistant Secretary of Defense, Installations and Housing, Office of the Assistant Secretary of Defense, Installations and Logistics to evaluate the policies and procedures used for the procurement and construction of military family housing facilities.<sup>125</sup> The audit was performed by the three service audit agencies coordinated by the Office of the Deputy Assistant Secretary of Defense, Audit. The review covered the timeliness and competitiveness of the turnkey and conventional procurement methods of family housing construction for Fiscal Years 1970 through 1974. It included funding controls, energy considerations, methods of procuring utility services,

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<sup>125</sup> Department of Defense, Office of the Deputy Assistant Secretary of Defense, Audit, Preliminary Report on the Interservice Audit of the Construction of Family Housing Facilities, 21 October 1974, p. 1.



government furnished equipment and other construction areas. Questionnaires were sent to construction contractors requesting their opinions concerning the strengths and weaknesses of the two procurement methods and recommendations for their improvement.

In the preliminary report, it was noted that the Navy and Air Force preferred turnkey rather than the conventional procurement method while the Army preferred the conventional method. The Navy has led the other services in the use of one-step turnkey and has achieved success with many projects while conforming to established construction standards. The Air Force believed that turnkey was good and a proven approach to procuring housing. The Army utilized the one-step turnkey method considerably less than the other services, choosing not to use this method in family housing construction until FY 1972. They believed that there were short comings in the quality of turnkey constructed homes and that a better product was obtained using the conventional procedures. The audit report indicated that the Army was experiencing difficulties in awarding their FY 1973 family housing program and as of 31 May 1974, only five of 15 approved turnkey projects were constructed or under construction.<sup>126</sup> This difficulty experienced by the Army is attributed to their method of amending the RFP and including more exceptions to the FHA-MPS than the Navy.

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<sup>126</sup>Ibid, p. 11.



The auditors reported that the turnkey method of procurement had evolved away from the original concept of obtaining from contractors, readily available designs and construction techniques peculiar to a particular community. They found little or no evidence that current projects used off-the-shelf designs mainly because of the requirements for details specified in the RFP. It was further found that the field of prospective bidders had been narrowed down to a relatively few large contractors who had obtained prior successful awards and could afford the cost of submitting proposals. Firms who lacked the capability of bonding, design, production and sufficient manpower and equipment and who had not been successful on one or two proposals dropped out of the competition because of high initial proposal costs.<sup>127</sup>

In response to the questionnaires sent to 247 construction contractors, 97 responded and generally expressed dissatisfaction and confusion with both turnkey and conventional construction methods.

The auditors had difficulty in obtaining full costs on projects using conventional contracting methods as in certain instances design costs were waived to preclude exceeding the average unit cost limitation specified by Congress.<sup>128</sup> They found no instances where design expenditures had been waived on turnkey projects as they had been included in

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<sup>127</sup> Ibid, p. 12.

<sup>128</sup> Ibid, p. 19.



the total contract bid price and therefore not specifically shown. This lack of uniformity in determining costs for turnkey and conventional family housing construction projects precluded accurate comparisons between the two methods and full disclosure to the Congress.

### 3. Military Services

Each of the three services have conducted in-house analyses relative to family housing total cost, net floor area, structural features, number of units, unit type, location aesthetic concepts, both structural and mechanical systems and cost per square foot. The Navy and Air Force studies support the concept of one-step turnkey construction while the Army, although they have used the one- and two-step turnkey concepts, prefer the conventional method for family housing construction. One Air Force study conducted by two Air Force officers as a thesis topic did not result in a favorable report on the use of one-step turnkey contracting.<sup>129</sup>

The objectives of the thesis were to compare the initial procurement costs and elapsed time of construction in procuring military family housing by the conventional, one-step and two-step turnkey methods. Multiple regression analysis was the basic technique used to test two hypotheses namely;

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<sup>129</sup> Krausse, D. A. and Smith, G. D., A Study to Determine if Design Procurement Methods for Military Family Housing Are More Economical than Conventional or Two Step Methods, Master of Science in Logistics Management Thesis, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, 15 September 1972, p. 8.



1. One-step turnkey was less costly than the other two procurement methods.

2. One-step turnkey was faster than the other two methods.

Available data for fifty-eight FY 1970 and 1971 tri-service family housing projects were collected, however, the study only included forty-five projects that provided all the data elements common for the average cost analysis and forty-seven projects for the time analysis.

The conclusions drawn by the study were:

1. The one-step turnkey procurement method was the most expensive when compared to the two-step and conventional methods. The analysis also concluded that there was no significant cost difference between houses procured with the two-step turnkey and the conventional methods.

2. There was no significant time difference from the date the design directive was issued until occupancy of the last house among the three procurement methods.

A review of the thesis by NAVFAC personnel indicated that in view of the title the more appropriate statistical analysis would have been the analysis of variance in comparison of mean values rather than regression analysis which seeks to evaluate functional relationships.<sup>130</sup> Many other factors weaken the thesis including the limited data base over two fiscal years, the number of dummy variables in the cost equation, suspect cost

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<sup>130</sup> Department of the Navy, Naval Facilities Engineering Command, memorandum, Subject: Cost of Military Family Housing Study; review of, Code 203 (Acting), 12 March 1973, p. 3.



data as exhibited by the decreased costs when a carport was included in the construction and the observation that one-step turnkey was the fastest of the three methods which conflicts with the final conclusions. To add to the lack of Air Force faith in the analysis, it has been reported that the one-step turnkey method is being extensively applied in the FY 1973 through 1975 Air Force military family housing programs, a complete reversal from the previous exclusive use of the two-step method.<sup>131</sup>

In mid-1970, a report completed by NAVFAC recommended that the Navy continue one-step turnkey contracting for military family housing and even expand its use to include larger projects to attract larger firms and increase the benefits to the government.<sup>132</sup> Additional recommendations of the report included, (a) minimizing the restrictions on the contractors to assure an adequate house and land usage, (b) take a strong Navy position in favor of one-step turnkey contracting and (c) eliminate the mandatory use of GSA procurement schedules for equipment and furnishings in order to take advantage of housing contractors large quantity purchases.

In August 1970, a report was issued by NAVFAC which analyzed three Navy family housing projects constructed under turnkey contracting procedures.<sup>133</sup> The intent of the study was to identify and answer questions

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<sup>131</sup>"The Cannon Experience-One Step Turnkey Housing," op. cit., p. 21.

<sup>132</sup>Department of the Navy, Naval Facilities Engineering Command, Report on Study of Navy Family Housing Construction, 3 June 1970, p. I-2.

<sup>133</sup>Department of the Navy, Naval Facilities Engineering Command, A Study of Turnkey Family Housing, August 1970, pp. 1-2.



related to housing project quality and quantity under the conventional and turnkey procurement methods, suitability of the turnkey procedure for Navy needs, cost differentials between the two construction methods, and resolution of continued Navy use of turnkey for housing procurement.

The report concluded that using the turnkey method, housing quantity was unaffected but quality was lower than the DOD standards, however, this was recognized as the requests for proposals were based on FHA standards. The general consensus of the study group was that the dwellings were adequate and suitable for their intended purposes.

Cost analyses were conducted of the three housing projects and a detailed analysis of the 100 unit project at the Naval Base, Philadelphia, Pennsylvania indicated a savings of approximately \$1000 per unit when compared to a similar project utilizing the conventional contracting method. The study group believed that savings using the turnkey method would be typical for other family housing locations.

Another NAVFAC study begun in August 1970 with a report issued in February 1971 resulted in the issuance of a new NAVFAC Instruction 11101.85A that prescribed uniform procedures for the procurement of Navy family housing by the turnkey method. It was concluded by the study group that the one-step turnkey approach offered the greatest opportunity for achieving maximum of quality and scope in military housing under existing legislation.<sup>134</sup> The in-depth report provided the following

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<sup>134</sup> A Report of Turnkey Procedures for Navy Family Construction, op. cit., p. III-1.



recommendations:

1. Each EFD should have a permanently constituted turnkey technical evaluation team and a selection board comprised of qualified officers and civilians.
2. The use of A-E firms in the evaluation process was questionable and may or may not improve the credibility of the Navy's selection process.
3. The cost of preparation of proposals by various firms could be further reduced by providing them with greater detail and site conditions and criteria in the RFP.
4. A time reduction in the evaluation-selection-award process was both highly desirable and possible.
5. The full disclosure of the RFP rating system to the proposers would increase participation and quality and minimize the possibility of protests.
6. Contractor quality control (CQC) was the most logical approach to turnkey housing project inspection.
7. Additional guidance for CQC and information concerning quality control levels should be provided in the RFP and emphasized at preproposal conferences.
8. Procurement of limited rights to the design of a turnkey project was in the best interests of the government. In addition, a maximum design fee should be stipulated in the RFP.

The Army has conducted similar studies on turnkey procurement. An Army report cited in Congressional hearings concluded that the average



project cost per square foot of the Navy FY 1971 family housing program was reduced from that of the FY 1970 program. The reason for this reduction was assumed to be attributable to the Navy's increase in the use of turnkey procurement from 38 percent to 56 percent in the FY 1971 program. No records could be found of comparative studies for the FY 1972 and 1973 programs.

### C. VARIOUS POSITIONS

The evaluation of turnkey procurement has been discussed as viewed by building contractors and as analyzed by cost analyses and reports of the GAO and DOD. The ensuing paragraphs discuss the positions of the private and Federal sector exclusive of the DOD and their evaluations of the turnkey concept.

#### 1. American Academy of Environmental Engineers

The American Academy of Environmental Engineers (AAEE) has argued against the turnkey concept as used by municipalities for waste water treatment plants. When the EPA attempted to increase turnkey usage in 1971, the AAEE was one of many organizations speaking in opposition. The AAEE urged its members in 1972 to make their expressions of concern known to their Congressmen in both the Senate and House.<sup>135</sup>

An attempt by DOD to utilize the turnkey concept in the environmental field would definitely meet with opposition from the AAEE.

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<sup>135</sup>"Turnkey Actions," The Diplomat, Vol. 7, No. 3, 29 August 1972, p. 6.



## 2. Associated General Contractors of America

The Associated General Contractors of America (AGC) and the Naval Facilities Engineering Command (NAVFAC) annual meetings in 1970, 1972 and 1973 were useful in interchanging suggestions in improving the turnkey procurement method. The AGC believes that the Navy has the correct approach to turnkey construction in providing better housing at lower cost.<sup>136</sup> In the 1970<sup>137</sup> and 1973<sup>138</sup> meetings, the AGC suggested for consideration (a) competitive bidding the site design to include underground utilities, (b) reducing the capital outlay by supplying bidders with site drawings, lot plans and off-site utility locations, and (c) holding educational seminars for contractors on how to do business with the Navy.

The AGC, as the contractors' national organization recognizes that turnkey contracting has been used very successfully for a number of years in the private construction market. They have noted that private owners appear to have the necessary control and professional capability to accomplish design-build (turnkey) work on a bid basis. However, the AGC has noted due to the inherent structure of most public bidding procedures, "it is recommended that Design-Build construction not be used

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<sup>136</sup>The Associated General Contractors of America, Naval Facilities Engineering Command Committee Report to the Board, 12 March 1973, p. 99.

<sup>137</sup>Ibid, 9 October 1970, p. 6.

<sup>138</sup>Ibid, 12 March 1974, p. 100



in the public sector."<sup>139</sup> This proposed policy statement is interpreted by the author to exclude the DOD and those Federal government agencies that have the expertise to properly evaluate turnkey construction proposals and administer procurement contracts.

The AGC in keeping its members informed of contracting methods has prepared and issued two turnkey guidance documents. They are (a) Owner's Guide, Building Construction Contracting Methods, and (b) Guide to Turnkey Construction, Standard Form #12B.

### 3. American Society of Civil Engineers

The American Society of Civil Engineers (ASCE) recognizes turnkey construction contracts "as an acceptable means of undertaking certain projects."<sup>140</sup> The society strongly recommends that the turnkey construction group's engineer uphold the ASCE Code of Ethics and that any competitive bidding for award of the construction project follow their guide on turnkey construction contracts. Their prime concern is that the relationships between the several parties involved in a turnkey contract are such that the interests of the owner are served satisfactorily by the engineering profession.

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<sup>139</sup>The Associated General Contractors of America, Special Contracting Methods Committee Report to the Board, 11 March 1974, p. 1

<sup>140</sup>American Society of Civil Engineers, Board of Direction, Guide to Turnkey Construction Contracts, 20 April 1974, p. 9.



#### 4. Congress

The House and Senate Committees on Armed Services and the House Committee on Appropriations have been proponents of the turnkey concept for construction of family housing (Supra III.B.1). Their advocacy of the concept has not abated but the Congress has not concurred in extending turnkey beyond the area of family housing construction. The DOD sponsored an amendment in 1973 to Section 604 of the FY 1974 Military Construction Authorization bill which would have authorized the use of turnkey for construction of all projects including family housing. The Conference Committee reported that although the Senate had voted in favor of the amendment, the House was adamantly opposed. The House believed that it would be a cardinal mistake to permit award of contracts on the basis of human judgment rather than mathematical calculation.<sup>141</sup>

##### a. Commission of Government Procurement

In 1969, the Congress established this committee with the prime purpose to:

"study and investigate the present statutes affecting Government procurement; the procurement policies, rules, regulations, procedures, and practices followed by the departments, bureaus, agencies, boards, commissions, offices, independent establishments, and instrumentalities of the executive branch of the Federal government; and the organizations by which procurement is accomplished to determine to what extent these facilitate the policy."<sup>142</sup>

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<sup>141</sup>U. S. House of Representatives, Military Construction Authorization Fiscal Year 1974, Conference Report, Report No. 93-634, 93rd Congress, 1st Session, pp. 38-39.

<sup>142</sup>U. S. House of Representatives, Committee on Government Operations, Report to accompany H.R. 474, Report No. 91-468, 91st Congress, 1st Session, p. 2.



The Commission conducted hearings over a two year period on the government procurement process and the commission members noted that it was very apparent that procedures traditionally in use by the Federal government required further continuous critical examination.<sup>143</sup> They believed that concerted steps should be taken by various concerned agencies to explore and apply all techniques which offer potential improvement to the Federal construction process.

In their discussion on the construction procurement process, the commission viewed the turnkey procedures as very attractive. They believed that it would offer significant potential savings when it could be established that existing industry standards and designs in use by turnkey contractors could adequately provide for the government's facility requirements in terms of both initial acquisition and life-cycle-cost considerations.

In reviewing the DOD use of both one-step and two-step turnkey procurement they observed that it had been utilized in a somewhat limited fashion for the acquisition of family housing, recreation facilities, and certain other facilities commonly provided in the commercial marketplace.

They concluded and recommended to the Congress, that "concerted effort should specifically be directed toward the increased

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<sup>143</sup> U. S. Congress, Report of the Commission on Government Procurement, Vol. 3, December 1972, p. 128.



use of design/construction (commonly referred to by many as turnkey) procedures."<sup>144</sup>

5. Consulting Engineers Council

The American Consulting Engineers Council (CEC), as the representative of consulting engineers, has been extremely vocal in opposing the use of turnkey contracting. The inherent features of turnkey involve the designers which are A-E firms and constructors, namely builders. Independent consulting engineers are excluded from this procurement concept and are replaced by engineers within the turnkey organization.

In 1969, with the release of the ENR annual report on the top 400 construction firms, the CEC community faced the reality that the turnkey concept was growing in popularity. In the May 1970 issue of their magazine, *Consulting Engineer*, it was admitted that the consulting profession had done little to offset the turnkey's appeal.<sup>145</sup> They had not challenged the turnkey companies claims to lower cost, nor had they undertaken any authoritative comparisons of quality on similar projects. The CEC in accordance with its code of ethics had not permitted consultants to advertise in competition with the hard-sell campaigns of the design-construct firms. The CEC contended that the independent consulting engineer was usually in the most advantageous position from a client's viewpoint.

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<sup>144</sup>Ibid, p. 128

<sup>145</sup>"CEC Comments-Let's Talk Turnkey," Consulting Engineer, Vol. 34, No. 5, May 1970, p. 62.



Mr. William R. Park, a senior engineering economist at the Midwest Research Institute, succinctly expressed the general position of the CEC in October 1971;

"The consulting engineer can operate independently on his client's behalf, drawing from a variety of available equipment the particular items best suited to the client's needs rather than being limited to a specific product line or proprietary process. The client who fails to take advantage of these independent services takes a chance on sacrificing both objectivity in design and economy in construction."<sup>146</sup>

The EPA's attempt in late 1971 to use the turnkey concept in waste treatment projects was strongly protested by the CEC (Supra III.B.5). Political pressure was also applied in the form of requesting more information on the EPA's intentions.<sup>147</sup> In hearings conducted on the subject by the EPA, the CEC mustered its forces and its major points were repeated almost verbatim.<sup>148</sup> At one hearing, a participant found himself reading material that was a word-for-word copy of the presentation made by the preceding speaker. Both were using material prepared by the CEC. The protests were finally resolved with the GAO ruling against the EPA and its use of the turnkey concept in sewage treatment plants.<sup>149</sup>

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<sup>146</sup>Park, William R., "Engineering Economics, Turnkey Engineering-Construction Projects," Consulting Engineer, Vol. 37, No. 4, October 1971, p. 59.

<sup>147</sup>"Turnkey Flap May Flip EPA's Opinion," op. cit., p. 15.

<sup>148</sup>"Turnkey Talks Rehash Old Arguments," Engineering News Record, Vol. 188, No. 3, 20 January 1972, p. 25.

<sup>149</sup>"Grants:EPA May Not Award Design and Construction Steps of Water Pollution Facility in Single Grant," op. cit., p. A-5.



Turnkey even took on the connotation of a four-letter word to the consulting engineers. At a February 1973 conference the CEC offered a substitute to turnkey in the form of the Construction Project Management Method (CPMM).<sup>150</sup> This method was based on the concept that design and value engineering would dominate and control the project while allowing for ample input of good construction and management principles. The consulting firm would, in effect, provide all of the services normally associated with design-construct except for the actual construction. There would be no prime construction contractor, but separate contracts between the owner and the contractors for each phase or type of construction activity would be awarded.

The CEC's initial counterproposal to turnkey was in the form of CPMM. This position has been further modified and entitled Turnkey-Plus.<sup>151</sup> The concept provides for full scope, single responsibility services beginning with early preliminary planning and extending through facilities startup and operator training.

In reality, Turnkey-Plus is simply the turnkey concept with the consulting engineer superimposed in the process and not necessarily adding to the benefits of turnkey contracting. When Turnkey-Plus is used

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<sup>150</sup>"Construction Project Management Method Proposed to Counter Turnkey," Consulting Engineer, Vol. 40, No. 4, April 1973, pp. 110,112.

<sup>151</sup>"ACEC Comment's - The Advantages of Turnkey-Plus," op. cit., p. 26.



by small firms in the private sector, it may be of some benefit but for the public sector and firms with experienced architects and engineers, it is an added expense.

The CEC adoption of Turnkey-Plus is not all inclusive as the term implies. The Turnkey-Plus approach, which is promoted actively by Western Europe and Japanese industries, is structured to include the following features:<sup>152</sup>

1. The design-build contract.
2. Management contract with a consulting engineer.
3. Manpower training and executive development.
4. Feasibility study.
5. Locating sources of long-term financing.

The CEC is now analyzing the fifth segment of the Turnkey-Plus concept and eventually it is considered that the five segments will be incorporated in the CEC's turnkey-plus concept.

The CEC has however, cautioned its members that their method is not appropriate for every project or for every firm and that it will reflect unfavorably on all CEC members if firms attempt to use the method and bungle a project. Mr. Frank Walk, Chairman of the CEC Industry and

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<sup>152</sup> Moor, Edgar J., "Turnkey-Plus Operations," Business Horizons, Indiana University Graduate School of Business, Vol. 16, No. 6, December 1973, p. 38.



Utilities Relations Committee, advised members "to remember that there are some types of projects for which the turnkey approach is the best solution." <sup>153</sup>

#### 6. General Services Administration

The General Services Administration conducted a comprehensive study of construction contracting systems used by their Public Buildings Service (PBS) division and other government agencies in 1970 (Supra III.B.6). Their report recommended the increased utilization of three alternate construction contracting systems:

1. Sequential design-advertised bid-construction system.
2. Turnkey construction system.
3. Construction manager system.

A fourth method, building systems, was still in the evaluation phase and was not submitted as an alternate contracting method pending its full evaluation.

Since the report, all indications are that the PBS is adopting the construction management (CM) concept as the method in future GSA construction. It is still too early to evaluate this method and the benefits which may accrue.

It is of interest to note that the CM method as envisioned by the GSA-PBS and the CEC position are very compatible and different versions

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<sup>153</sup>"ACEC Counters Turnkey," Consulting Engineer, Vol. 42, No. 5, May 1974, p. 110.



of the same technique as viewed by an agency of the Federal government and a spokesman of the private sector.

The author believes that GSA's conviction that their CM concept is the only salvation in coping with today's design and construction problems is actually a turnkey concept in disguise. It lacks the principle advantage of turnkey, the fixing of a sole source responsibility for design and construction.

#### 7. National Society of Professional Engineers

In a letter reply to the author regarding the National Society of Professional Engineers' (NSPE) position on turnkey contracting, Mr. Milton F. Lunch, their General Counsel stated: "...we are somewhat like the Congressman who was asked his position on a controversial bill. He replied, 'some of my friends are for it, and some of my friends are against it.' When pressed for his position, he said, 'I am for my friends.'"<sup>154</sup>

The NSPE recognizes the turnkey method of construction procurement as a legitimate contractual instrument. They have analyzed the concept and their public expressions on the subject are typified in a panel report issued at their 5th annual National Conference of Professional Engineers in Industry held in October 1967.

"Obviously, the turn-key type of contract should not be used and cannot be used for every project. It is incumbent upon the owner, in

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<sup>154</sup>Lunch, Milton F., General Counsel, National Society of Professional Engineers, letter of 19 July 1974.



the light of a specific job, to weigh all the advantages and disadvantages before making a final decision."<sup>155</sup>

The NSPE did oppose the EPA attempt to use the turnkey method in sewage treatment plants construction.<sup>156</sup> However, the author interprets this position as their being in agreement with other societies that the EPA was acting independently of the Congressional statutes as enacted in the Federal Water Pollution Control Act.

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<sup>155</sup>Westerhoff, Russell P., op. cit., p. 35.

<sup>156</sup>"Turnkey Flap May Flip EPA's Opinion," op. cit., p. 63.



## VI. TRENDS IN TURNKEY CONSTRUCTION PROCUREMENT

### A. DEPARTMENT OF DEFENSE

#### 1. Current Position

The initial reluctance of the Department of Defense in the implementation of turnkey contracting prompted the GAO and the Armed Services and Appropriation Committees of the two chambers of Congress to chide the services in their lack of responsiveness to committee desires (Supra III.B.a,b and c). After the concept was initiated in the FY 1969 military family housing program, both in the one- and two-step turnkey versions, the DOD increased its usage so that at the present time, all the services are using the one-step turnkey concept in their family housing programs. This common usage does not imply that it is universally accepted as noted in the recent audit report conducted at the OSD level.<sup>157</sup> The Army is presently experiencing difficulty in awarding its FY 1973 family housing program and is negotiating to remain within the statutory limitations. The Air Force and Navy have not to date experienced similar difficulties as their RFP's generally utilize FHA-MPS with a minimum of exceptions to meet the user wishes.

The Air Force and Army have used in the past the two-step turnkey method for both military family housing and other various projects.

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<sup>157</sup> Report on the Interservice Audit of the Construction of Family Housing Facilities, op. cit., p. 7.



The Army has used the two-step turnkey concept for incinerators, guest quarters, bachelor housing and commissary stores with procurement costs ranging from \$40,000 to \$15 million. The Army as the construction agent for the Air Force has utilized two-step in the FY 1969 C5A aircraft facilities at Dover and Altus Air Force Bases.<sup>158</sup> In addition, the Air Force awarded two large military construction contracts in FY 1973 using the two-step turnkey method. The Navy has limited experience with the two-step method and its use has been basically oriented toward selected technical procurement projects. Examples include electrical service for a NASA satellite test center, reserve technical training building, smoke abatement system, central heating plant expansion and BOQ furnishings.

The ASD (I&L) memorandum guidance issued on 27 November 1972 and reissued in December 1973 to clarify the DOD use of both one- and two-step turnkey procedures continues as the official DOD policy on turnkey procurement.<sup>159</sup> This guidance policy has not been expanded into a DOD instruction as it is directive in nature and an interim measure while increasing experience and education in the use of the one- and two-step turnkey procurement techniques.

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<sup>158</sup> A Report of Turnkey Procedures for Navy Family Housing Construction, op. cit., pp. I-1 and I-2.

<sup>159</sup> In review of both FY 1974 and 1975 Military Construction Appropriation hearings, the author noted that the principal witnesses of the three services stated they were satisfied with the existing ASD (I&L) guidance.



In conjunction with the policy guidance, the DOD has also proposed a revision in section 604 of the general provisions of the FY 1974 military construction and appropriations bill to authorize the use of one-step turnkey as an alternative to the use of conventional formal advertising. The House of Representatives adamantly opposed the revision even though the Senate and Joint Armed Services Committees favored it.

## 2. Future Position

In the past, the DOD has been criticized for purported overly restrictive contracting methods in obtaining military family housing, for not getting full value for the dollar and for not using the latest construction materials and techniques. With Congressional encouragement, the DOD implemented both one-step and to a limited extent two-step turnkey construction. The Congressional refusal to accept the amendment to section 604 of the FY 1974 MILCON bill now limits the use of the turnkey contracting procedure to military family housing. In addition, legal interpretation of this action precludes its extension to the construction of mobile home facilities.<sup>160</sup>

The DOD is at an impasse with the Congress on the extension of the one-step turnkey method into other military construction areas other than military family housing. Expansion of the concept into other areas

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<sup>160</sup> Department of Navy, Naval Facilities Engineering Command, Code 09CH memorandum, Subject: Use of Turnkey Procedures for Mobile Home Facilities, 10 December 1973, p. 2.



will not be authorized by the Congress until it is mathematically proven that the concept is superior to the conventional method.

The Department of Defense has not formulated and issued future planning guidance other than the ASD (I&L) guide memorandum issued in November 1972 and reissued in December 1973. Determination of further expansion of the one- and two-step turnkey methods will be predicated on implementing the recommendations contained in the final version of the 21 October 1974 Deputy Assistant Secretary of Defense, Audit report. These recommendations include:<sup>161</sup>

1. Issuance of a DOD Instruction for military family housing outlining the turnkey and conventional procurement policies with uniform guidelines and concepts.
2. Establish and maintain a relevant dialogue between the DOD and construction industry representatives to clarify the DOD family housing program.
3. Family housing construction funds authorized by Congress be used only for that purpose and that non-dwelling facilities be constructed with minor construction or post-acquisition funds.
4. Implementation of procedures to identify all costs to construct both turnkey and conventional family housing.

In addition to implementation of the audit report recommendations, it is anticipated that in-depth OSD sponsored cost studies of the

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<sup>161</sup>Report on the Interservice Audit of the Construction of Family Housing Facilities, op. cit., pp. 13, 14 and 19.



three services will be conducted of previously constructed military family housing projects starting with the FY 1969 program and including the latest completed project. Cost studies will also be conducted of one- and two-step turnkey constructed military construction projects other than family housing. All the OSD sponsored studies will include comparisons between initial turnkey and conventional construction costs, and life-cycle costs. Future DOD action will also include improvements to the RFP and adoption by the three services of a standard form. The technical evaluations and selection processes will be refined and included in a DOD issued instruction.

The turnkey construction concept will not be used in family housing construction at locations similar to the Bolling-Antacostia complex where commissions similar to the National Capital Planning Commission express their desires not to use the turnkey method. In addition, isolated locations and a small number of housing units will inhibit turnkey contractors interests.

#### B. OTHER GOVERNMENT DEPARTMENTS AND AGENCIES

The Department of Health, Education and Welfare (HEW) will continue in the future as it has in the past with the conventional construction procurement method. The Construction Manager (CM) concept initially employed by HEW in 1972, will continue to be tested and evaluated. Conclusions and recommendations on this approach have not been finalized by the HEW.



The Department of Housing and Urban Development (HUD) was the first Federal government department or agency to use the turnkey construction concept. It has incorporated within its organization a separate division with the responsibility of expediting action on turnkey programs. HUD has issued guidelines and implemented multi-faceted turnkey concepts for new construction, rehabilitation, and rent-purchase options. By the use of the Accelerated Turnkey Program (ATP), HUD has further attempted to decrease the award-occupancy time period in turnkey construction. The HUD has a viable construction program and is creative in using the turnkey procurement method. HUD is attuned with the spirit of the Commission on Government Procurement recommendations. The DOD would well benefit by maintaining close liaison with this department.

The Environmental Protection Agency (EPA) has been rebuffed in using turnkey construction of sewage treatment plants. The 1 July 1974 GAO ruling that the Federal Water Pollution Control Act did not authorize the use of the turnkey concept will require the EPA's strict adherence to the Act as amended by Congress. Further attempts by the EPA to utilize the turnkey concept in construction of projects to protect the environment have not been expressed. Unless the Congress expressly authorizes utilization of the turnkey concept, it is anticipated that future projects will be accomplished using the conventional construction technique.

The turnkey concept as envisioned by the General Services Administration (GSA) is being used experimentally on simple design projects. Since the initial use in the construction of five office buildings in 1971,



the GSA has issued a directive implementing the construction management (CM) concept as modified to include phased construction, separate construction contracts, and project and construction managers. Both the CM concept and a modified sequential design-bid-construct system are the two principal methods being employed by the GSA for the construction of all Federal government general-purpose public buildings. Since the November 1971 announcement of using the turnkey method and issuance of the invitation for proposals, the GSA has not announced further utilization of the turnkey concept.

#### C. PRIVATE SECTOR

During the 1960's there was a steadily increasing trend in the private sector toward more extensive use of the design-construct effort and the use of turnkey operations. Congressional interest and eventually advocacy of the turnkey concept was finally tested and implemented by the DOD in military family housing construction. Other Federal agencies and departments as well as state agencies also awarded contracts on a turnkey basis.

Mr. T. C. Cooke, in reviewing the construction industry for the 70's anticipated greater utilization of value engineering and turnkey construction. He supported his observation when he stated,

"Turnkey design-construct operations will have great appeal to all large building or plant owners. This is not only because of the predicted shorter construction time, but because they will be relieved of so much of the economic, legal, and financial burden by use of the turnkey operation. This is not something we can observe carefully and hope will go away. It is here."<sup>162</sup>

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<sup>162</sup> Cooke, T.C., "Turnkey Operations & Value Engineering-Two Things We Will See More of in the 1970's," Professional Engineer, January 1971, p. 28.



Current rapidly changing economic conditions will favor in the future the utilization of the construction method that can complete a project in the shortest time and within a fixed price. With the time saving advantages of phased design and construction and the cost savings inherent in the team concept of turnkey construction, it is anticipated that the private sector will increase its utilization of the turnkey construction technique.



## VII. SUMMARY, FINDINGS, RECOMMENDATIONS AND AUTHOR'S OBSERVATIONS

This summary section of the final chapter of this paper is provided as an overview of the first six chapters. It has been extended purposefully and is directed to the reader interested in reading a capsule summary, then continuing on to the findings and recommendations. If the reader has read the first six chapters, then he may proceed to the findings and recommendations omitting the summary, section A of this chapter.

### A. SUMMARY

The process of construction procurement includes the interdependence of the owner with the architect, the engineer and the construction contractor as bound by either competitive bid or negotiated contracts. The contracts as employed by the Federal government including the Department of Defense differ in the degree and timing of contractor responsibility and the profit incentive to achieve or exceed specified standards or goals.

The employment of design-construct (turnkey) contracting, which is developed in Chapter III of this thesis, had its origin in the industrial construction of chemical plants, refineries, pulp and paper mills, and steam driven turbine-electric power plants to cite a few examples. It has been used extensively in the construction industries of Europe, Latin America, and more recently by Japanese construction firms.



In recent years, the U. S. House of Representatives and the U. S. Senate Committees on Armed Services and the House Committee on Appropriations have expressed interest in the Department of Defense employing one contract to both design and construct military family housing units. This concept of contracting entitled turnkey, is employed by the DOD in the one-step negotiated and the two-step formal advertised methods.

Other Federal government agencies and departments including HUD, EPA and GSA have employed the turnkey concept. Presently only HUD is a prime advocate of the method while the GSA has only experimented with the concept and the EPA, which was initially a strong advocate, only has congressional authority to use the conventional design-advertise-award-construct method.

The Department of Housing and Urban Development, in addition to new construction by the conventional technique and purchase of existing housing and leasing of structures, employs the turnkey concept for (a) new construction, (b) rehabilitation, (c) Turnkey III, turnkey with the option for tenants to rent-purchase homes, and (d) the Accelerated Turnkey Program (ATP), a streamlined version of the turnkey concept (Supra III.B.4).

The Department of Health, Education and Welfare employs the Construction Management (CM) technique in awarding contracts in addition to the conventional method. The CM method is based on an independent engineer working with an owner and architect to formulate the project



design, furnish the architect with the latest construction technology and market conditions to ensure that a design stays within budgeted funds. The CM also manages the procurement effort, inspects the construction of a project and is capable of providing a wide range of other related services.

The GSA conducted a comprehensive study on the construction systems employed by their Public Buildings Service division and other Federal government organizations (Supra III.B.6). The recommendations of the GSA report were:

- (1) Make major modifications to the sequential design-bid-construct system and use on major projects.
- (2) Utilize the CM system for multi-story office buildings, complex design projects and other projects costing over \$5 million.
- (3) Use turnkey construction experimentally just on simple design projects.

GSA's hesitation on wholly endorsing the turnkey concept was due to the study group's belief that on complex buildings requiring numerous technical decisions during design and construction, the turnkey system could prove difficult to administer. The source of the difficulty would be the inherent conflict between the GSA desire for high quality and the developer's motivation to reduce the quality in order to stay within the budget. The evolution of GSA's experience and studies has culminated in their system for Construction Management (CM) encompassing phased construction, separate construction contracts, project and construction managers.



Chapter IV reviews the military services approach in utilizing both the one-and two-step turnkey concepts. Prompted by a September 1967 GAO draft report recommending that DOD re-evaluate its military construction practices and procedures and Congressional interest in utilizing the design-construct technique, three sites were chosen and turnkey was utilized in building family housing. Since FY 1969, the Navy has or is in the process of constructing 13,941 units out of a total of 20,910 authorized housing units utilizing the one-step turnkey method.

While the Navy began with and has continued to utilize the one-step method for military family housing and Navy Lodges construction, the Air Force and Army initially used the two-step concept. Both services have since changed their approach and now also use the one-step method in family housing construction. The Army has also used the two-step method for other projects including incinerators, guest quarters, bachelor housing and commissary stores.

The legal justification for one-step negotiated turnkey contracts is justified under the provisions of 10 U.S.C. 2304(a), subsection 10, "the purchase or contract is for property or services for which it is impracticable to obtain competition" as implemented by the ASPR 3-210.2(iii), "when it is impossible to draft for a solicitation of bids, adequate specifications, or other adequately detailed description of the required supplies or services." The two-step formally advertised turnkey procedure is outlined in ASPR section 2-102.1.



Under the Navy one-step turnkey procedure, a request for proposals (RFP) is publically advertised. The RFP sets forth the scope of work, information concerning site boundaries, topography, utility services, soil and subsoil conditions, and a complete description of the terms of the proposed contract with ground rules for submission, evaluation and selection of a proposal. The methods of evaluation and selection are then applied and award made. Selection and award are predicated on the maximum quality for a fixed price. Thus, the most innovative application of design, construction methods, and materials is achieved within identified project funds.

The two-step formally advertised method also utilizes a publically advertised RFP however, the initial proposals are submitted less a sealed fixed price. After the proposals are technically evaluated and identified as to acceptability or non-acceptability, sealed bids are then submitted by the proposers for acceptable proposals. Selection and contract award are consummated based on the lowest responsive bid as bounded by identified project funds.

The policy and guidance issued on 27 November 1972 by the Assistant Secretary of Defense, Installations and Logistics, for both one-and two-step turnkey and later reissued in December 1973, guides the three services in turnkey construction. This policy, in memorandum form, is directive in nature and is an interim measure pending increased experience and education in the use of the one-and two-step turnkey procurement techniques.



Mr. John T. Gallagher in analyzing turnkey contracts in the private sector observed that they were very definitely a function of the general level of business activity.<sup>163</sup> A review of the Engineering News Record tabulation of the top 400 construction firms for the nine years ending in 1973 supports this observation. The percentage of contracts awarded to turnkey firms between 1965 and 1972 averaged 30 percent while in 1973, a period of slow economic growth the same type of firms subsequently increased their percentage to 37 percent.

Turnkey contracts generate a higher expense factor to the proposers in preparing their submittals. Contractor reactions to the concept are mixed but based on the results of a 1969 survey conducted by the AGC, 85 percent of their replies regarded the turnkey concept as the future trend in the building construction industry.<sup>164</sup>

Section B in Chapter V provides a summarization of the cost analyses and reports issued by the GAO, Assistant Secretary of Defense - Comptroller (ASD-C), and the three services. The GAO studies favorably view the turnkey concept in military family housing and cost savings were realized without significant loss of quality or features normally found in conventional housing.

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<sup>163</sup>Gallagher, John T., op. cit., p. 218.

<sup>164</sup>"Turnkey Construction:Trend of the Future?", op. cit., p. 25.



The ASD-C preliminary report and review covered the timeliness and competitiveness of turnkey and conventional procurement methods of family housing construction for fiscal years 1970 through 1974. The auditors observed that the Army preferred the conventional method while the Air Force and Navy preferred turnkey in construction of military family housing. The report noted that the initial turnkey concept of using off-the-shelf designs and construction techniques standard to a particular community was lacking. The field of prospective bidders has been narrowed down to a relatively few large contractors who had previously obtained awards and could afford the higher costs of submitting proposals. Cost comparisons between turnkey and conventional contracting was difficult as design expenditures in conventional projects was not always included in the total costs.

The three services have conducted analyses of the turnkey concept and the studies generally support the concept of one-step turnkey for family housing construction. An exception is a thesis completed in September 1972 by two Air Force officers wherein they concluded that both two-step turnkey and the conventional methods were less expensive than one-step turnkey based on completed FY 1970 and 1971 housing projects. Their second conclusion was that there was no significant time difference from the date the design directive was issued until occupancy of the last house among the three procurement methods.

Navy studies conducted by the Naval Facilities Engineering Command conclude and recommend one-step turnkey contracting for construction of



military family housing projects. The reports conclude that the one-step approach offers the greatest opportunity for achieving maximum quality and scope under existing legislation.

The turnkey concept is also evaluated in Chapter V, Section C, as viewed from both the positions of the private and Federal sector exclusive of the DOD. All of the associations recognize the turnkey concept as a formidable construction procurement technique. The majority recognize the concept as a valid method of construction but maintain their positions with respect to its influence on their existence. Associations like the ASCE and AGC center their concern on the relationships between the several parties involved in a turnkey contract. Their prime concern is that the interests of the owner are served satisfactorily by the engineering profession.

In December 1972, the Commission on Government Procurement issued their report to the U. S. Congress. After two years of hearings and in-depth studies of government procurement, the commission concluded and recommended that "concerted effort should specifically be directed toward the increased use of design/construction (commonly referred to by many as turnkey) procedures." The members further believed that concerted steps should be taken by various concerned agencies to explore and apply all techniques which offer potential improvement to the Federal construction process.

Chapter VI discussed the current and future positions of the Department of Defense. Based on previous experience with turnkey construction



the DOD attempted in the FY 1974 Military Construction Appropriations bill to legitimize one-step turnkey as an alternative to the use of conventional formal advertising. Congress's refusal to revise the statutes will hinder the use of the turnkey concept beyond construction of military family housing. It is envisioned that in the future and prior to reintroducing legislation to expand the turnkey concept, the DOD will be required to take positive steps to justify the existing concept. Positive steps will include; (a) issuance of a DOD instruction codifying a standard set of turnkey evaluation and selection procedures for military family housing, (b) completion of in-depth cost analyses and quality comparisons for family housing construction from FY 1969 to the present time, (c) cost and quality analyses of all other military construction projects that utilized the one- and two-step turnkey concept, and (d) life-cycle-cost comparisons between completed and comparable conventional and turnkey projects.

The Department of Housing and Urban Development is the only other Federal government proponent actively using the turnkey concept. The HUD has modified its organization to expedite action on turnkey programs. The EPA was another strong advocate but, is not authorized by existing legislation and will follow the conventional technique.

The HEW and GSA are proponents of the CM and the conventional methods. The GSA has experimented in 1971 with turnkey on simple design projects but favors the CM method in addition to a modified sequential design-bid-construct system.



The private sector will continue to employ turnkey design-construct contracts. The turnkey advantages of shorter time and fixed prices will be more effective in dealing with the current and future conditions of material shortages, high labor and material costs, low labor productivity and unstable industrial and family housing construction demands.

## B. FINDINGS

1. The Department of Defense recognizes that one- and two-step turnkey procedures are not panaceas but are two of many effective specialized procurement techniques when selectively applied.

2. The Congress opposes the use of one-step turnkey on other than military family housing. The House and Senate Committees on Armed Services and the House Committee on Appropriations have been advocates of one-step turnkey for military family housing but have not expressed their positions on its use for military construction of other various projects.

3. The three services presently use one-step turnkey for military family housing construction but, the Army favors the conventional method and is currently experiencing difficulty in awarding its FY 1973 family housing program using the one-step technique.

4. The OSD has not conducted in-depth initial or life-cycle cost and quality evaluations of completed projects comparing conventional and turnkey construction.

5. Turnkey procurement has been successful in awards of contracts within project funds while the conventional approach has experienced problems requiring redesign-rebid.



6. Turnkey quality of military family housing while possibly inferior to previous DOD levels compares favorably with private housing using FHA-MPS and is satisfactory for military family housing.

7. GAO reports and cost analyses support the turnkey concept.

8. The Commission of Government Procurement recommended greater effort be directed in the increased use of turnkey procedures. However, the Congress and most Federal agencies and departments have been slow to react to this recommendation. The only two departments that utilize turnkey are the DOD and HUD while GSA and HEW prefer the CM and conventional construction methods. The EPA has favored the use of turnkey but is not authorized under existing statutes to use the concept.

9. The turnkey construction technique has been in use many years by the process industries. It is a standard construction method in much of Europe and Latin America and is gaining popularity in Japan and the United States.

10. The Navy has issued and utilized a NAVFAC Instruction 11101.85B for turnkey procurement of military family housing. This proven instruction using the one-step technique describes and defines in detail the technical evaluation, selection and award concepts.

11. All Navy studies conducted on the subject of turnkey reflect support of the one-step competitive negotiated concept that is utilized in the construction of military family housing.



12. Projects repetitive in nature and available in the commercial market that can be specified to comply with industrial and performance specifications are suitable for turnkey procurement.

13. The three services currently attempt to use the turnkey concept for construction of all family housing. However, housing at remote locations and in aggregate totaling less than 200 units are economically analyzed for completion by either the conventional or one-step turnkey methods.

14. Construction contractors view the turnkey concept as the trend of the future and both government and independent surveys indicate acceptance of the concept.

15. The general level of business activity influences the degree of turnkey and conventional construction contract awards. The turnkey concept gains greater usage in periods of slow activity and conversely is less popular when business activity is active.

16. Proposers on turnkey contracts incur higher bidding costs in comparison to the conventional approach of submitting sealed bids on definitized government drawings and specifications.

17. Advantages of one-step turnkey contracting include the following:

a. Earlier project completion when design and construction proceed concurrently.

b. The turnkey design-construct team approach provides excellent information interchange, operating efficiency, design and construction transfer, and a single point of contact.



- c. There is maximum design competition and reduced DOD design costs.
- d. Contract award is based on an optimum quality-price ratio.
- e. DOD can utilize CQC more effectively.

18. Disadvantages of the turnkey method include:

- a. Less control of the contract as specification plans are in essence shop drawings.
- b. Reuse of turnkey plans may prove to be difficult as the conventional method is not authorized an additional five percent square foot of floor area above existing maximum statutory limits.

19. Most professional societies and industry associations are basically neutral in turnkey acceptance with the exception of the Consulting Engineers Council. The Council advocates their Turnkey-Plus concept.

## C. RECOMMENDATIONS

The first category of recommendations pertains to the area wherein the Office of the Secretary of Defense and his Assistants have prime responsibility. Sufficient time has elapsed since the turnkey concept has been used in military construction and family housing projects. Experience and knowledge have been acquired to transfer into meaningful and definitive criteria. Accordingly, it is recommended that OSD initiate the following:



1. Develop and issue a DOD Instruction for one- and two-step turnkey construction procedures. Incorporate the ASD(I&L) memorandum of 27 November 1972 and the NAVFAC Instruction 11101.85B of 10 October 1974 in the DOD Instruction.

2. Initiate in-depth cost and quality analyses of all completed military construction and family housing one- and two-step turnkey projects starting with the FY 1969 military family housing program. Include within the studies all life-cycle-costs. Further, analyze the effects on related projects that used the CQC concept. If the results are favorable with regards to the use of turnkey, reintroduce legislation with supporting data to authorize its use for all military construction projects.

3. Consider in RFP proposal submittals the initial submittal for the technical evaluation phase and within a predefined time, the later submittal of sealed price bids for the selection and award phases. This will allow more time for the proposers to prepare better competitive bids especially in times of rapid material and labor price changes.

The second group of recommendations requires OSD and three service coordinated actions for implementation. These are:

1. Improve communications between OSD(I&L) and the three services. This may be achieved by means of the OSD sponsored turnkey evaluation studies with three service membership of knowledgeable personnel. The by-products of such joint endeavors will provide a basis for upgrading communications.



2. In conjunction with the above first recommendation, increase use of two-step turnkey contracting to incorporate and expand upon the list of potential projects provided in the OSD(I&L) memorandum of 27 November 1972.

3. Continue close coordination of RFP releases and contract awards. This is essential if the turnkey concept is to be meaningful and considered for use beyond military family housing construction.

The last set of recommendations pertain to the three services. These include:

1. Improve on methods of informing contractors and describing the differences in conventional and turnkey concepts. Describe the complete technical evaluation, selection and award procedures to interested proposers with special emphasis on small eligible contractors.

2. In conjunction with the above recommendation, closely analyze all RFP's for family housing projects under 200 units and/or in remote locations in order to attract local builders. Encourage the local builders to use off-the-shelf designs thereby decreasing their initial proposal preparation costs.

3. Incorporate all design and construction costs in conventional and turnkey construction methods to provide base data for accurate comparisons between conventional and turnkey construction projects.

4. Minimize use of non-standard or additional criteria above industry standards in RFP's. This will reduce proposal costs, decrease confusion of proposers and encourage more competitive proposals.



5. Analyze HUD organization and concepts used in turnkey administration. Adopt and utilize the best HUD features in the DOD program.

#### D. AUTHOR'S OBSERVATIONS

The author has attempted to objectively analyze the turnkey one- and two-step construction methods as used within the DOD. Also, he has attempted to analyze the concept as used by the private sector and other Federal government sectors.

The Commission on Government Procurement was austere in recommending concerted efforts be made in increased use of turnkey procedures. The DOD, one of the two Federal departments that employ the turnkey construction technique, was initially enthusiastic in employing the turnkey procedure but to date has failed to complete an objective comparison between conventional and one- and two-step turnkey construction. This failure has been reflected in the Congress's opposition to expand the concept beyond the limits of military family housing construction. Even the latest preliminary audit report by the ASD-Comptroller does not provide the data results of an in-depth analysis required at the OSD level.

The potential for turnkey usage for many additional segments of military construction is large and only inhibited by the lack of industrial and performance specifications, and the degree of repetitiveness and availability in the commercial market. Turnkey construction contracting is indeed not a panacea for all military and family housing construction.



Unfortunately, until such time that OSD provides the firm guidance to the three services, the turnkey concept within the DOD will remain limited to family housing construction.

The recommendations in section C of this chapter have been offered as a means to stimulate action in analyzing the turnkey construction concept within the DOD. Formation of an OSD sponsored tri-service Ad Hoc committee to analyze and coordinate OSD efforts will be of benefit to the DOD.



## APPENDIX A

### Acronyms

AAEE	American Academy of Environmental Engineers
A-E	Architect-Engineer
AGC	Associated General Contractors of America
ASCE	American Society of Civil Engineers
ASD	Assistant Secretary of Defense
ASD-C	Assistant Secretary of Defense-Comptroller
ASPR	Armed Service Procurement Regulations
BEQ	Bachelor Enlisted Quarters
BOQ	Bachelor Officer Quarters
CEC	Consulting Engineers Council
CM	Construction Manager/Management
CPAF	Cost Plus Award Fee
CPFF	Cost Plus Fixed Fee
CPIF	Cost Plus Incentive Fee
CPMM	Construction Project Management Method
CQC	Contractor Quality Control
DOD	Department of Defense
EEO	Equal Employment Opportunity
EFD	Engineering Field Division
ENR	Engineering News Record
EPA	Environmental Protection Agency



FHA	Federal Housing Administration
FPR	Federal Procurement Regulations
FY	Fiscal Year
GAO	General Accounting Office
GMP	Guaranteed Maximum Price
GSA	General Services Administration
GSA-PBS	General Services Administration-Public Buildings Service
HEW	Department of Health, Education and Welfare
HUD	Department of Housing and Urban Development
I&L	Installations and Logistics
LCC	Life Cycle Costing
MCAF	Military Construction Air Force
MILCON	Military Construction
MPS	Minimum Property Standards
NASA	National Aeronautics and Space Agency
NAVFAC	Naval Facilities Engineering Command
NSPE	National Society of Professional Engineers
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
P.L.	Public Law
PM	Project Manager
R&D	Research and Development
U.S.C.	United States Code



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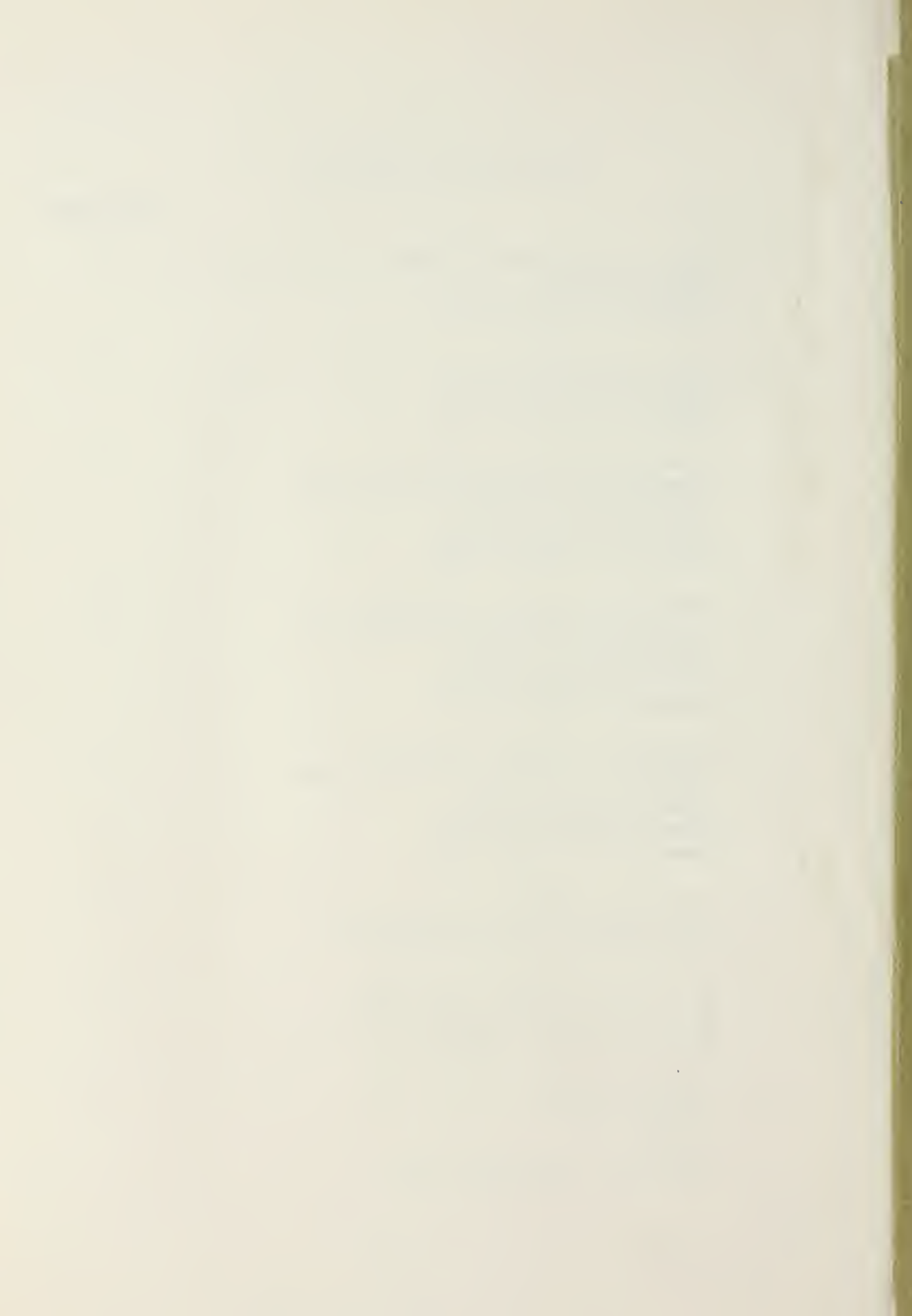
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